

MASTERFILE III

DATA FILING AND RETRIEVAL For
HOME And BUSINESS

FOR AMSTRAD CPC 6128

(Also extended 128K CPC 464/664)

Dealer Details and Invoices

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* ALTER Record * I:insert E:erase A:alter R:raw data Other:exit
File: FILE2 Records:0016 Selected:0016 Parents:0000 RAM used:02K from 64K

Campbell Systems



MASTERFILE III

MASTERFILE III is an information filing and retrieval program for use with the Amstrad CPC6128 or equivalent computer. The program runs under ASDOS and requires just a single disc drive.

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Author: John A Campbell

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Acknowledgement: We thank ARNOR Ltd whose MAXAM and PROTEXT software was used to develop, test, and document MASTERFILE III.

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MASTERFILE III

MASTERFILE III is an information storage and retrieval system for use with the Amdex CPG125 or equivalent computer. The program runs under Amdex and requires just a single file drive.

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CONTENTS

Page

PART 1:

GENERAL

Introduction	5
Getting Started	6
MASTERFILE Conventions	6
Key Notation	6
Menus and Prompts	7
The Text Editor	8
Essential Definitions	9
Disc and File Management Principles	12
File Names	13

PART 2:

DETAILED USER GUIDE FOR ALL USERS	15
MAIN MENU	15
Printer Control Codes	16
Purge: Block Erasures	17
Hi-resolution Screen Copy	17
Data and Data Names	18
Data Names and References	18
Special Data References	19
Data Reference Prompt	19
Inserting New Records	20
FORMAT Creation and Maintenance	20
Screen Lay-out	21
Text Print Lay-out	22
Creating a format	22
Altering a Format Questionnaire	23
Geometry	23
Format Details	24
Heading	24
Record Data	24
Ruled Line	25
Other Format Manipulations	26
Higher Level Format Options	26
DISPLAY Mode	27
Displaying File Records	27
ALTER Record	29
Raw Data	31
Word Processing	31
Numeric Data	32
Record Numbering	33
PRINTED Output	33
Single Record Print	34
Wide Reports	35
Deep Reports	35
Page Numbering	35

CONTENTS

SEARCH Mode	35
Searching the File	36
Searching by Several Criteria	38
Examples of Search	39
How to Store Dates	40
SORTING the File	40
Embedded Sort Keys	41
Multiple Sort Keys	41
Sorting a Relational File	42
File Statistics	42
SAVE/LOAD/MERGE etc	43
PART 3:	
ADVANCED FUNCTIONS USER GUIDE	46
DATA EXPORT	46
RELATIONAL Files	48
Ordering the Data Names	49
MUSIC Example	49
Sorting a Parent/Child File	51
Duplicate Parents	52
Orphans	52
Child-less Parents	52
USER BASIC Processing	52
GETR: Access a record	54
GETD: Get Data from Current Record	54
PUTD: Insert/Replace Data in the Current Record	55
ERAD: Erase Data from the Current Record	55
ERAR: Erase the Current Record	55
INSR: Insert a New Empty Record	55
UNSL: Un-select the Current Record	55
Examples of USER BASIC	56
Error Handling	57
FIELD-TO-FIELD CALCULATION via UBGEM	57
PART 4:	
EXAMPLES AND EXERCISES	59
Key-by-key Example	59
Follow-up Exercises	62
Steps in Building a New File	63
PART 5:	
CUSTOMISATION	65
Colours	65
KEY Expansions	65
POKE Customisation	66
Saving MASTERFILE	67
PART 6:	
TIPS AND TROUBLE-SHOOTING	68
PART 7:	
APPENDIX	70
Memory Organisation	70
File Structure	70
GLOSSARY OF TERMS	72

INTRODUCTION

MASTERFILE III is a further development of a long line of MASTERFILE programs, originating in 1980. MASTERFILE 464 and MASTERFILE II both published by Amsoft are the more recent ancestors, and any files created by these two versions may be read directly by MASTERFILE III.

In the interests of brevity we will in future refer to MASTERFILE III simply as MASTERFILE.

A computer filing system must store, search, sort, display, and print your filed information. It must also permit updates by way of insertions, erasures, and changes. The way to ensure that data can be manipulated in all these ways is to force an **organised** approach to your information, dividing it into files, records and fields. With most computer filing systems, the systematic approach is taken to extremes by demanding that the user predicts the length and format (e.g. integer, string) of the data.

MASTERFILE also requires an organised approach, but only in as much as you decide what to call your data, and give some thought as to its total volume. Apart from that, with MASTERFILE there are no decisions to make about data sizes, and no need to worry about format — all data is stored as variable-length text. New fields can be added or removed at any time. New styles of display can be devised at any time. Disc space is not pre-allocated. There is no wasted space.

With MASTERFILE, the way in which data is presented is not related to the way in which it is stored, and you can devise several different screen views of the same files of data. The display styles can be as diverse as address labels, index cards, and summary tabulations with automatic column totals.

We have provided the means to communicate file data to other systems, for example to feed a mail-merge word-processor. For the user who has some BASIC knowledge, there is scope to combine tailored BASIC processing with MASTERFILE.

Other advanced functions include RELATIONAL files, where CHILD records all share data stored in their PARENT record. This feature is rarely seen even in quite large computer systems.

The program is menu-driven, by which we mean that the screen always contains instructions on what to do next, or a list of options.

There is much to learn in MASTERFILE, but the rewards are huge. We advise the beginner to spend plenty of time examining the sample files on the disc, and to delay setting about the advanced uses, such as Relational Files, until one is quite proficient with the easier aspects of MASTERFILE.

GETTING STARTED

Take a working copy of the MASTERFILE disc, using CP/M DISCKIT3 for example. Do not un-protect your original MASTERFILE disc. Keep it only as an emergency back-up. We have no objections to the owner copying the program solely for security or customisation purposes.

Reset the computer, put the copy disc into drive A and RUN "DOC" [ENTER] to view/print any corrections and other information we may have compiled since this manual was written!

For many users, the sheer size of this manual and the range of functions offered by the program will seem daunting. We suggest the following learning plan:

- a) Complete reading this section (PART 1).
- b) Explore! Reset the computer and RUN "DISC" [ENTER] to bring up MASTERFILE directly. With the main menu showing, load one of the example files (FILE1, FILE2, MUSIC) by keying for example:

LFILE2 (and press the ENTER key)

Remove the disc. Now see how far you can get just using the menus and prompts. Don't worry, you cannot possibly do any damage!

- c) Study PART 2, but only "Main Menu, Data Names, Insert New Records".
- d) Glance through PART 2 "FORMAT creation" and "DISPLAY Mode".
- e) Work through PART 4 "KEY-BY-KEY" Example, and as much as you can of the follow-up Exercise.
- f) Re-read PART 2, all of it this time.
- g) Design and build your first file from scratch, taking note of PART 4 "Steps in Building a New File".
- h) Read the rest of the manual at your leisure.

MASTERFILE CONVENTIONS

We now describe in general the key notation used in this manual, and the overall style of dialogue between the user and the program. For many users, the following needs but a glance. Users who are new to CPC work should study this chapter thoroughly.

Key Notation

Throughout this manual, we refer to the special CPC keyboard keys which have words on them, using square brackets: thus [DEL] means the key with "DEL" on it, and not D, E, L keys. Whilst CPC464 has a [CTRL] key, the equivalent key on the CPC6128 is [CONTROL]. We will use the [CTRL] to mean either. The [RETURN] and [ENTER] keys are equivalent unless you have redefined one of them. In this manual we refer to [ENTER], but either will do.

The so-called "cursor" arrow keys — the ones you use when editing a BASIC program — are clumsy to describe in a manual, and confusing in that there is another upwards arrow key to the left of [CLR]. So we will pretend that the cursor keys have words on them as follows:

[LEFT] [RIGHT] [UP] [DOWN]

These refer therefore to the arrow keys — bottom right on the CPC6128 and top right on the CPC464/664.

Another artificial notation we use is [SPACE] which refers to the space bar at the bottom of your keyboard.

Where two keys are required together, we use e.g. [CTRL LEFT] meaning hold down [CTRL] then press [LEFT].

CPC464 users please note that [f0] — [f9] refer to the numeric pad keys, which on other CPC models are labelled as function keys f0—f9.

When we refer to a specific key option in a sentence, we use the square bracket notation. Thus we speak of options [D] and [X] being those which are chosen by pressing the "D" key or the "X" key. In our text we use upper case for clarity but in practice the [SHIFT] key is not used except possibly in TEXT mode, described shortly.

Menus and Prompts

A MENU is list of options from which you select one by pressing the indicated key. MASTERFILE is said to be "menu-driven" which means that in general the program always offers you a visible choice of action, and you steer your way by pressing keys prompted by the menus. There are two main styles of menu:

- a) A window in the centre of the screen, for example:

```
Un-select all records.....Z
Select data matching [OR].....S
Un-select non-matching [AND]....U
Select all parents.....P
Un-select all parents.....Q
Children of selected parents....C
Invert selection.....I
Display selected records.....D
Exit to main menu.....X
```

- b) A brief list in the message window near the bottom of the screen

MENU INVITING A/E/I/N/D/P/X KEYS.

```
A:alter E:erase I:insert item N:next item D:Display P:Print X:exit
File: FILE2 Records:0016 Selected:0016 Parents:0000 RAM used:02K from 64K
```


In either case, respond with one of the indicated letters. Notice that although the letters are shown in upper case, and also in this manual for clarity, the SHIFT key is not required. Note also that there is no need to use [ENTER] except where this is itself a listed option.

A prompt is an instruction to press a key or else to enter text.

When text is requested, the characteristic text window is shown at the bottom of the screen, the rectangular cursor appears ready to echo what you key, and completion of your data entry is normally via the [ENTER] or [RETURN] key. This is described in greater detail shortly.

When two menus or prompts are on the screen at the same time, respond to the most recent, which will normally be the menu or prompt in the lower part of the screen. In exceptional circumstances, an AMSDOS message may appear outside the MASTERFILE menu/message windows; but the message window will also contain a prompt as to how to proceed.

Many menus allow the use of [ENTER] or [ESC] to mean a change of mind, or **back out** as we call it, where we thought it useful. Back out options are not always listed.

In two situations, MASTERFILE will respond to a menu without showing it on the screen. This is so as not to obliterate what is already on the screen. But in both cases the message window invites you to overlay the hidden menu in case you wish to remind yourself of the options. These two situations are:

- a) DISPLAY mode, where your record data fills the screen.
- b) Save/Load where a catalogue fills the screen.

The Text Editor

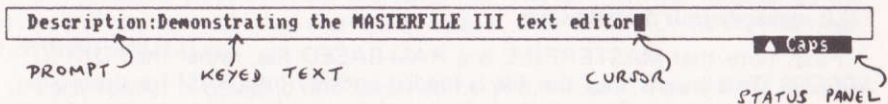
Any text you enter, whether data for your record, or a file name, or a format heading, uses a common text editor, which works inside a characteristic window at the bottom of the screen. Following a prompt message, the cursor rectangle indicates the start of your text entry. This may either be blank, or else an existing piece of text for you to edit. Indeed, once you start keying text you can immediately edit it, and only when you use [ENTER] does the program use what you have keyed.

The editor accepts up to 240 characters, which is the maximum field length. Any attempt to exceed this simply **beeps** and refuses. The editor window is too small to show the whole of a large text entry but it gets over this by clever shifting of the text right or left, depending on the direction of travel of the cursor.

At the lower right of the edit window is a smaller panel in reversed colours. This is the edit status panel and it may show a small triangle to remind that you are in **insert** mode. When in insert mode, the editor inserts text rather than overstriking it. Use [UP] to turn on insert mode, and [DOWN] to revert to overstrike mode. The panel may also show the legend "Caps" or "Shift", referring to the fact that CAPS LOCK or SHIFT LOCK are active. In our experience, the use of SHIFT LOCK is usually undesirable and mostly comes up by accidental use of [CTRL CAPS].

The full list of control keys used by MASTERFILE Text Editor is as follows:

[LEFT]	Moves the cursor left
[RIGHT]	Moves the cursor right
[CTRL LEFT]	Direct move of the cursor back to the 1st character
[CTRL RIGHT]	Direct move of the cursor right by one window width
[UP]	Further text will insert — notified by the panel triangle
[DOWN]	Further text will overstrike — removes the panel triangle
[CLR]	Erase the character under the cursor
[DEL]	Erase the character to the left of the cursor
[ENTER]	Signals that you have completed text entry/edit
[ESC]	Signals that you have abandoned text entry/edit



ESSENTIAL DEFINITIONS

Consider the following pieces of information:

"D J Williams"

"0227 566198"

"24 Acacia Avenue, Epping"

In general, we can call this DATA. In particular, each of the three items we will call a FIELD. Where data fields are associated with each other, such that for example the telephone number and address shown are those of "D J Williams", then one would usually arrange that the fields are stored together. This is like writing them all on the same index card; we call such a grouping of data a RECORD.

Now, suppose that we have another set of data:

"F Thorpe"

"01-507 5561"

"2 The Drive, Barking, Essex"

Clearly this looks similar in structure to the earlier group, and indeed we can regard this as another record of the same FILE. But now consider the following data:

"Nocturne in E flat"

"F Chopin"

"J Lill"

"Philips BBL 7384"

Assuming that this musical data is mutually associated, i.e. the work is composed, performed and recorded as described, then this too constitutes a RECORD, but most assuredly not in the same FILE as the other two examples. We would not intermingle pages of our address book with pages of our music library catalogue.

Thus we can define a FILE as a set of RECORDS of similar structure, each record comprising associated data FIELDS. This definition would apply to virtually any computer filing system.

Where computer filing systems differ is in the number and length of the fields permitted, the file capacity, disc storage method, and so on. But the scheme of FILE — RECORD — FIELD is universal.

We now move from the general to the particular, and discuss how MASTERFILE manages your data files.

First, note that MASTERFILE is a RAM-BASED file, rather than DIRECT-ACCESS. This means that the file is loaded entirely into RAM for processing, then written back to disc entirely before updates can be said to be permanent. By contrast, a direct-access system is one where individual records are read from and written to the disc. Each system has its advantages — and its disadvantages. We believe that the RAM system has more advantages, except where really huge files are concerned.

We have established that MASTERFILE's unit of disc storage is a FILE. Since the whole file must fit in RAM, the capacity of any one file is limited to RAM space rather than disc capacity. The amount of RAM which MASTERFILE uses for file space is 64K (65,536 bytes). This will hold about 1,100 records of the kind exemplified by "D J Williams" earlier.

An individual FIELD can contain between 1 and 240 characters of data, and furthermore, all fields are **variable-length**. This is quite unusual among filing systems. The main advantage of variable-length fields is that there is no wasted space. There can be up to 50 fields per record, and since all fields are variable-length, so too are the records.

Another attribute of MASTERFILE is that not all fields are compulsory. For example, if you need to store extra "Notes" against a few records, then you can do so using a field which need not be present in the other records of the file. This is all in stark contrast to direct-access systems where the maximum field length must be pre-determined and allocated for every record. Generally, MASTERFILE's 64K file capacity is equivalent to 100K or more of a direct-access system.

The overwhelming advantage of MASTERFILE's RAM-based file method is that of sheer speed of search, sort, display. And wear and tear of the disc drive and discs is minimal.

The maximum number of fields in a record is about 50, more than enough for most common applications, and in practice between 3 and 12 are more usual. Each field may only occur ONCE per record.

Each field is known by its DATA NAME. A data name is a word or short phrase which describes the data, for example "Customer name", or "Address" or "Invoice number". Associated with each data name is a single key-letter, called the DATA REFERENCE. For example, "Customer Name" may have a data reference of "N". The purpose of a data reference is to be able to communicate with just one key, which data field we are manipulating. For example, in order to alter a particular record we specify which field by pressing its data reference key. If you have just a few data names, then it is useful as a memory aid to choose a data reference letter which coincides with the start of the data name. But this is not essential and if there are more than a dozen or so data names then this becomes impractical.

One of the many features of MASTERFILE which sets it apart from lesser filing systems is the ability to present your data in a huge variety of ways, and in several different ways even on the same file. The term we use to describe the style and content of the displayed data is REPORT FORMAT, although FORMAT will suffice.

Each format is designed and specified by you, the user. You tell the program about the general layout — such as how many lines to reserve for column headings — and about which fields are to be shown at which line and column on the screen, and how they are to be shown — e.g. left-justified or right-justified, column-totalled, etc. Also you can embellish the display with ruled lines for that truly professional effect. Since you can have several different formats used in a file, each format has to be identified, both with a TITLE, and with a FORMAT REFERENCE letter.

Data references and data names are stored in a special record near the start of your file. Report format specifications are also stored as special records, following the data names. In fact, precisely where and how these special records are stored is of no concern to the user, except to impress that when a FILE is saved or loaded, all its associated data names and formats are saved or loaded with the data proper. They too occupy some of the 64K file space, although rarely more than 5% of the available RAM.

The MASTERFILE program is kept as a separate entity from its files. Once the program is loaded, any of its files can be loaded or saved on demand, using MASTERFILE's save/load menu options. When a file is loaded, any file already loaded is instantly forgotten — unless the special MERGE option is used. MASTERFILE has its own built-in disc catalogue facility, and even offers disc file erase operations so that "housekeeping" can be done all from within the MASTERFILE environment. This need not be limited to MASTERFILE files.

Summary of terms described above

FILE	: collection of similarly-structured data records
RECORD	: group of associated pieces of data
FIELD	: unit of data within a record
DATA NAME	: description of a field
DATA REFERENCE	: key letter to refer to a data name or field
FORMAT	: specification of how to display your records
TITLE	: description of a report format
FORMAT REFERENCE	: key letter to refer to a format

DISC AND FILE MANAGEMENT PRINCIPLES

MASTERFILE program components and files may be stored on any disc, data format or system format, with other unrelated programs or files if need be. But the recommended practice is to use data-formatted discs (which hold more data than system discs), and to keep a copy of MASTERFILE on each file disc.

You can have as many files as will fit all on one disc, but make sure there is enough "free" space to accommodate an update of the **largest** of the files.

Whatever changes are made to a file in RAM are not permanent until the file has been saved again. Save is **not** automatic; rather it is done on demand only. If you are making many changes to a file, say over several hours, then it is wise to make intermediate saves as well as an end-of-session save.

A save will normally be done onto the same disc and using the same file name as when the file was loaded. AMSDOS automatically renames the original with a ".BAK" suffix, and any older ".BAK" version is erased.

For small files, it may be that you never need erase the "dead wood" from a disc, provided you keep using the same file names. For larger files, you will probably be restrained to just one file per disc side, so as to make room for three versions. Yes, **three versions**. Consider repeated saves of file "ABC". CAT will usually show that the disc has "ABC.BAK" and "ABC.BIN", the BIN version being the latest version. But when a save is in progress, "ABC.\$\$\$" is saved, and the oldest BAK version does not get erased until all of the new file is stored. The last AMSDOS step is to rename the \$\$\$ suffix to BIN. Hence during a save the disc needs room for BAK, BIN and \$\$\$ versions of your file.

For very large MASTERFILE files, there may not be room for three versions, e.g. $3 \times 64K = 192K$, and a data disc only holds 178K; and we want to store MASTERFILE on there too, about 20K. Therefore, before you can re-save a very large file, you must erase its BAK version. You will find that MASTERFILE offers disc file erase facilities.

The AMSDOS ".BAK" method is useful for immediate back-up purposes. Suppose you discovered that you have saved your file in error, perhaps having erased several records which should have been kept. You can recover by loading the ".BAK" version instead of the current version. Therefore, as long as space permits, it is best to refrain from erasing BAK files sooner than necessary.

Whilst you can maintain files indefinitely on the same disc, if you value your data then you should:

SAVE FILE BACK-UPS ONTO SEPARATE DISCS REGULARLY

Whilst 3" discs are very reliable in normal use, you must insure against physical loss or damage, e.g. coffee spillage, accidental re-format. Weigh the cost of a few extra discs against the effort of rebuilding your data files from scratch. This same **principle** applies to all files and programs which are subject to update or change. Many people only pick up the habit of taking back-ups **after** their first major mishap. Be smart, and get into the habit **before**!

MASTERFILE also supports cassette files, by virtue of a tape-select option. You might consider using cassettes as a low-cost alternative to archive your old files. Tape select is also useful to read cassette files if you have just upgraded from tape-based MASTERFILE 464.

FILE NAMES

When saving a file, you can give any name which is valid to AMSDOS, i.e. any mixture of up to 8 letters and numbers, with optional suffix of up to 3 letters and numbers. This suffix is called the FILE TYPE, and a period separates it from the file name proper. If you do not supply a file type, MASTERFILE attaches a ".BIN" file type by default.

It is best not to give an explicit file type as a rule, but if you need to keep a special version of a file then file type can be useful to high-light it. Avoid using ".BAS", ".COM" etc. Do not christen a file "MF128 ..." as this will be in conflict with the MASTERFILE program components.

When loading a ".BIN" file, it is not necessary to key the file type. Thus to save or load file "MUSIC.BIN", only "MUSIC" need be keyed. If by some mischance you have "MUSIC.BAS" on the disc, then you **MUST** supply the ".BIN" when loading, otherwise AMSDOS loads the ".BAS" in preference. (MASTERFILE will then reject it.)

A new file acquires a name only when it is saved; until then the file statistics will show a name of "NOTNAMED". If you see NOTNAMED.BIN in your disc catalogue, this is probably your new file except you forgot to give it a name when you saved it. It will load correctly.

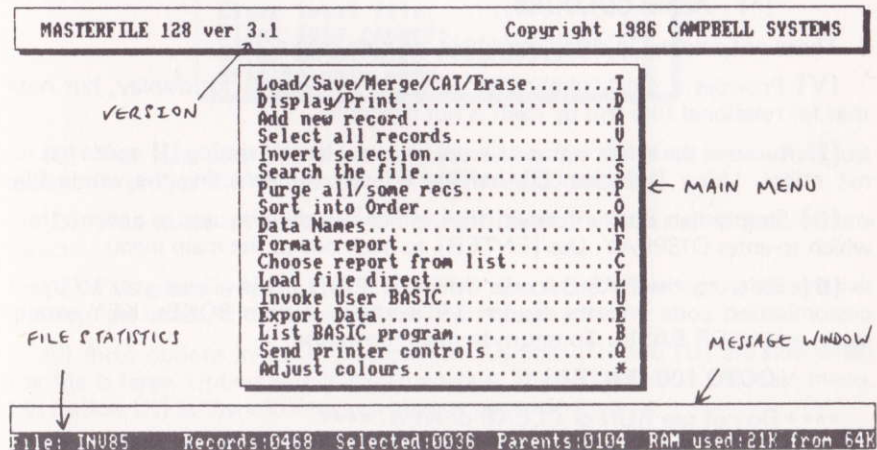
When loading or saving, the drive used is whatever is currently selected. MASTERFILE offers a drive A/B select function, but you can instead supply the drive as a prefix to the file name, "B:MUSIC" for example, meaning file MUSIC on drive B. If you have DISC drive C then this is how you may access it.

An invalid file name is reported by AMSDOS as "Bad command".

It is possible to rename a MASTERFILE file, using BASIC |REN etc, but note that if you do this, the file name as it appears in the file statistics panel will be the original save name.

MAIN MENU

This is the menu which first presents itself on load of the program. The screen includes not only the main menu but also the program title, version, and copyright. The file statistics panel is also present, as usual. Think of the main menu as being the central control panel. In this manual, we give many examples of key sequences, and in most cases these assume that your starting position is the main menu.



Most of the options are covered in depth elsewhere, but here is a brief summary of the main menu options.

- [T] To do with LOAD and SAVE of files.
- (D) DISPLAY and print.
- [A] ADD one or more NEW RECORDS to the file.
- [V] Make all records SELECTED.
- [I] Make un-selected records selected, and vice versa.
- [S] Enter SEARCH mode to select file records.
- [P] PURGE all or part of the file from RAM.
- [O] (Letter O) SORT the file into order.
- [N] Create/maintain DATA NAMES.
- [F] Create/maintain FORMATS.

- [C] List/CHOOSE format titles.
- [L] Direct file LOAD.
- [U] Execute USER BASIC.
- [E] EXPORT data for other programs.
- [B] LIST BASIC.
- [Q] Send printer control codes.
- [*] Adjust COLOURS.

Those not covered in detail elsewhere are discussed now:

[V] Provides a quick method of selecting all records for display, but note that for relational files this by itself is not desirable.

[I] Reverses the select status of every record. Hence pressing [I] twice has no net effect. Using [V] then [I] has the effect of un-selecting the whole file.

[C] Simply lists all the format titles, which can then be used as a menu from which to enter DISPLAY. Use [ENTER] to back out to the main menu.

[B] Exits to the BASIC loader which it LISTS. This allows you to insert customisation code into the loader, for example custom POKEs, KEY expansions, and USER BASIC. To return to main menu, use:

GOTO 100 [ENTER]

**** Do not use RUN or CLEAR or NEW. ****

Printer Control Codes

Main menu [Q] offers a convenient way to send control commands to your printer, and such command codes must be entered one at a time as decimal number between 0 and 127. BEEP means that you have entered a bad value. For example, to set an Epson-compatible printer line feed to 1/8", send ESC "0" via:

[Q] 27 [ENTER] 48 [ENTER] [ENTER]

The printer must be switched on and ready, otherwise the system will wait. [ESC] will interrupt such a wait.

[ENTER] or [ESC] by themselves will terminate and return to main menu.

PURGE: Block Erasures

PURGE means the erasure of data from the file in RAM. The contents of any disc file are not affected unless the purged file is re-saved. Main menu [P] takes you to the Purge menu which is:

Purge all/some recs

```

Clear total file.....C
Clear data records.....D
Clear unselected records.....U
Exit to main menu.....X

```

[C] This is a total file erasure, which leaves the RAM as if you had just loaded the program, with file name of NOTNAMED showing.

[D] This erases all the data records, but leaves the data names and formats intact.

[U] This erases only the UN-SELECTED data records, leaving the data names and formats intact, and leaving SELECTED records intact.

All three options invite [Y] to confirm. Options [D] and [U] are slow when the file is large. Option [C] is instantaneous. They all return to the main menu, but option [X] is there in case you change your mind.

If you wish to erase all SELECTED records, just use main menu [I] first.

Hi-Resolution Screen Copy

Most of the illustrations in this manual have been produced by MASTERFILE, using the key combination of [CTRL 0]. This is suitable only for Epson-compatible printers which accept the use of ESC "L" n1 n2 to initiate graphic mode. The program will respond to [CTRL 0] at any time when it would respond to a single key menu or prompt. It will not respond if the program is "busy" or if the text editor is active (cursor blob is showing) or during DATA REF prompt.

It is best to switch your printer off then on after using this function, since the copy routine sets the line feed to 7/72" and leaves it like that. Also, if you abandon a copy mid-way (unready the printer and [ESC], subsequent copy or text print may be spoiled.

Screen copy reproduces every pixel on the screen. The printing is somewhat slower than text printing, and is typically 30% flattened. We put it in mainly for our own purposes, i.e. for the manual illustrations. It is the only MASTERFILE function which is not mentioned in any of the menus or prompts.

DATA AND DATA NAMES

Before describing how records are created, we examine the process of setting up the data names and data references — usually the first part of establishing a new file. We also discuss some special data references, and the characteristic way in which MASTERFILE asks you to choose data.

Data Names

When creating a new file, the first step is to establish the data names and data references to be used in the file. Data names are listed when you press [N] at the main menu. Initially there are none to see, and you must follow the menus and prompts to insert them one by one.

Data Names

D:Description
M:Maker
I:Model
S:Serial Number
V:Replacement Value

I:insert	E:erase	P:print	X:exit
File: FILE2	Records:0016	Selected:0016	Parents:0000 RAM used:02K from 64K

Use [I] to insert a new data name. You are immediately asked where to insert, and you can for now just press [ENTER]. If there are already some names listed on the screen, then you can instead indicate after which name you wish to place the new one. You do this by pressing the appropriate data reference key. The order in which the names are listed is the order that data will be prompted when data records are created.

Having established where in the list the new name is to go, you are then asked for the new data reference, which you indicate by pressing its chosen key. Then you are asked for the data name itself. Try to use a meaningful but brief name, preferably no longer than 18 characters. When you give the new data name, the list of data names is re-displayed, and the menu returns.

Although any keyboard character may be used as a data reference, we suggest that you limit yourself to the letters of the alphabet, and try to use letters which remind you which field, e.g. [N] for "Name", [D] for "date". There are only 26 letters since like menu keys, the data reference alphabet is regardless of SHIFT. If you need more than 26 data names, then you must use numerics or the special symbols such as colon, plus, minus, percent etc. The limit we can list on the screen is 48 data names; it is possible to squeeze a few more but then the display starts to overlap itself.

Other Data Names menu options are:

[P] to print the list.

[E] to erase a name.

[X] to return to the main menu.

There is no direct way to move or alter a data name. Instead you must erase then re-insert it. When you insert a new record into the file, MASTERFILE prompts you for data using the data names, in the sequence as listed.

Special Data references

Record numbers use data references [!] and [#], the first being the physical record number, the second being the selected record number. Therefore, avoid using [!] and [#] in your data reference list. You can still search on [!] and you can display [!] and [#], but do not store such data in your file. Record numbers are **implicit** and **imaginary** data; they occupy no file space.

Global string scan during search is specified using the data reference [*], so it is best to avoid using [*] as a real data reference.

For relational files, two special data references are used to identify parent and child records respectively. These are parent link [>], and child link [↑], and you use them by giving them data names, just as you would any other data field. All this is explained more fully in the RELATIONAL FILES chapter, but for now just remember that unless you have parent/child records, avoid the use of data references [↑] and [>].

Date Reference Prompt

With the exception of Data Names mode as just described, every time MASTERFILE wants you to choose a data reference, it presents you with a characteristic menu of data references such as:

Data refs	D: Description	M: Maker	T: Model
	S: Serial Number	V: Replacement Value	

If there are more than six data names, then they are shown in groups of six with just a brief pause between changes. This rotation can be frozen by holding down [SPACE], and it resumes movement when [SPACE] is released.

Although this prompt lists only the named data fields, it will in fact respond to any character key, and regardless of which set are currently prompted. It is therefore merely a memory jogger. Of course, depending on the context, the chosen key may be rejected as when for example you try to erase a field which is absent.

The reason for limiting your data names to 18 characters is now clear; longer names are accepted but get truncated when prompted in this manner.

INSERTING NEW RECORDS

There are two ways to insert new records into a file:

- a) Main menu [A] to ADD new record(s) onto the end of the file.
- b) Display mode [I] to INSERT new record(s) after the target record.

In both cases, MASTERFILE prompts for data against each data name in turn. You don't have to enter any data however, as just [ENTER] will skip that field. Another special key is [ESC] which skips the rest of the data names — unless a parent name is present. (This is covered in more detail in the PARENT/CHILD chapter.)

As each field is entered, the new record is displayed in the RAW state. When there are no more fields to key or to bypass, MASTERFILE then offers the chance to make further adjustments and it does this by entering ALTER Record mode, as described later. If there are no further changes to make to the new record, just press any key except [I,E,A,R]. This completes the new record and no further changes can be made to it except via DISPLAY mode [A] etc.

You are then invited to press [A] to start ANOTHER new record, and if you choose [A] then the new record is started immediately following the one just completed. Otherwise, any key except [A] will terminate and resume either the main menu or display mode, depending on how INSERT was reached.

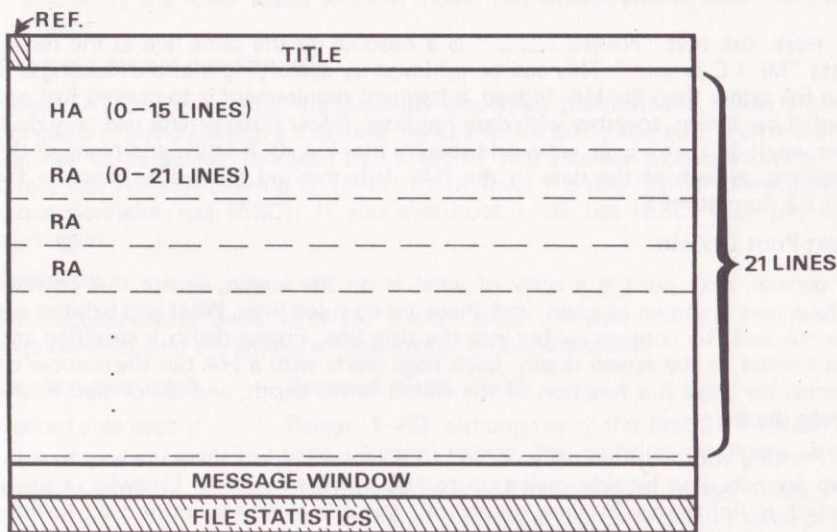
New inserted records start their existence as SELECTED. If you start to insert a record but then change your mind and refuse to enter any data, the empty record is removed from the file. (Note: Earlier versions of MASTERFILE did not do this.)

FORMAT CREATION AND MAINTENANCE

The way in which file data is presented is called a FORMAT. A format is a collection of instructions on which fields to show where, how, and with what headings etc. You can have several formats associated with the same file, so to differentiate them you give them a reference key, such as [1], [2] etc.

Screen Lay-out

You have a great range of possible screen formats, as you can see from the example files. Formats have a common plan as follows:



The top line is reserved for the report title, which is automatically centred. Under this comes the HEADING AREA, or HA for short. The HA can be 0–15 lines deep. Beneath the HA come one or more RECORD AREAS, RA for short. The RA can be 1–21 lines deep, nominally. Generally, the HA is reserved for fixed headings, while each RA is reserved for data from ONE record. There can be exceptions, but for now this rule will suffice. MASTERFILE will determine how many records per screen will fit. HA and RA are 80 columns wide, and MASTERFILE stays in 80 column mode (mode 2) throughout. The bottom three screen lines are “out of bounds”.

When you build a report format, you supply line (and column) numbers, and with text or data you also specify whether HA or RA. In either case, the line number you give is relative to its HA or RA space. Hence the first line in the HA is line 1, and also the first line in the RA is line 1.

A format can be further embellished with ruled lines, either across or down, and with these the line number you give is relative to the whole screen, such that the top-most line, containing the format title, is line 1.

You do not have to use every line in the HA or in the RA, so you can adjust the HA and RA depths to control the clear space above the topmost record and between records.

It is often desirable to have fixed text on the same line as your data; for example consider the following:

NAME.....: Mr J C Brown

Here, the text "NAME.....:" is a heading on the same line as the record data "Mr J C Brown". This can be achieved by specifying that the heading is in the RA rather than the HA. Indeed, a frequent requirement is to present just one record per screen, together with data headings. (Most filing systems can only do it this way!) In such a case, we would specify that HA=0, RA=21, and place all the headings as well as the data in the RA. This method is used in example file FILE2, format ref 2.

Text Print Lay-out

In general, text print is a copy of what is on the screen, except that reverse-colour text is shown as plain, and there are no ruled lines. What gets printed are the HA and RA contents — but not the title line. Forms depth is specified and not limited to the screen depth. Each page starts with a HA but the number of records per page is a function of the stated forms depth, and is not tied to the screen depth.

Printing width is nominally limited to 80 columns, but there is a way to print two formats side by side, giving up to 160 printed columns. Likewise, a single record is limited to 21 lines depth, but there is a way to print two formats interleaved giving up to 42 lines of data per record.

Creating a Format

The way to create and maintain your formats is from main menu [F], which then produces the format menu:

Format report

```
New format.....N
Review format.....R
Erase format.....E
Copy format.....C
Exit to main menu...X
```

To create a new format, as you would initially, use [N] here. You are then asked to supply the format reference, by which this new format is to be known. Press any suitable key, e.g. [2]. This is acknowledged by the following:

Format ref 2: Geometry

```
Heading area depth.....00
Record area depth.....21
Forms depth.....66
Single sheet pause.....N
Forms margin.....00
Connect code L/R etc.....0
Border colour.....23
Title.....INDEX-CARD STYLE
```


A format is made up of several "questionnaires", of which this first one, entitled "Geometry", is compulsory. You will notice that it is already filled in with DEFAULT values. The most important values are the HA and RA depths. If you study the lower menu window menu, [A] invites you to alter the questionnaire.

Altering a format questionnaire

Select [A] option to alter the currently displayed questionnaire. When a questionnaire is being altered, a diamond marks the line being altered. To alter a line, just key its parameter followed by [ENTER] if the cursor blob is showing. To skip a line without altering it, [ENTER] by itself. To skip further alterations to a questionnaire, use [ESC]. If you overshoot a line, use [ESC] then [A] and start again.

Geometry

This questionnaire deals with the overall shape of your format, its printing requirements, and the title. Each parameter is now discussed:

Heading area depth:	Range of values: 0—15
Record area depth:	Range: 1—99, although only the first 21 lines can be used. Larger values for printing purposes only.
Forms depth:	The total number of lines per page. Range: 1—99. For 11" forms, at 6 lines per inch, the default value of 66 applies. The value 99 means "endless page". Other values cause page separation, with repeat HA at the top of each fresh page, and at least 6 clear lines between RA and the next HA to straddle the perforation.
Single sheet pause:	Y or N. Y causes a pause between pages to prompt the feed of each single sheet.
Forms margin:	The width of the left-hand margin required. This margin applies only to the printer, not to the screen display.
Connect code L/R etc:	Normally left blank, but when two reports are to be printed double-width or interleaved vertically, use this to encode one of the following, which must be keyed in UPPER CASE. L left-hand of a pair R right-hand of a pair T top of interleaved pair B bottom of interleaved pair
Border colour:	The screen border colour can be specified. Each format can have its own border colour.
Title:	This is centred in the top line of the screen.

Format Details

The geometry by itself does very little, one must supply further details using more questionnaires. Each questionnaire generates a format ITEM and the menu option [I] is used to insert an item. After [I] is pressed you are asked to select one of three kinds of item:

H:heading D:record data L:line

Press [H], [D] or [L] accordingly to initiate a questionnaire, which then appears and awaits your tailoring. Any number of items can be created, and in any order. Each of the three is now explained.

Heading

This item is used where you wish the format to include some fixed piece of text such as a column heading or auxiliary title. The text can appear just once in the HA (by default), or in each RA. The parameters are very simple:

HA = 0 or RA = 1:	The default is 0, but enter a 1 if the RA is required.
Column:	That at which the text is to start.
Line:	That in which the text is to appear.
Inverse:	Y or N. Y means that the paper/ink colours are reversed.
Heading text:	The text itself. No processing is done on the text, which is displayed exactly as you key it here. The MASTERFILE text editor can be used to edit any existing heading.

Record data

At least one such item must be included in a format for it to be useful, since it is these items which causes data from your records to be displayed. When you inspect the parameters, the full power of MASTERFILE becomes evident. For example, a single field can be displayed as a paragraph of any shape or size, and word-processing is automatic. Single-line data can be left/right justified, and there are several special options for numeric data, including column totals.

The parameters are as follows:

Data reference:	That of the field to be displayed.
HA = 0 or RA = 1:	Same meaning as with headings, except that the default is RA.
Column:	Left-most of the paragraph space in which data is to be shown.
Line:	Top-most of the paragraph space.
Width:	How many columns wide.
Depth:	How many lines deep.
Inverse:	Y or N. Y means that paper/ink colours are reversed.

Right-justify:	Y or N. If Y and if Depth = 1, causes data to be right-justified. This is usually preferred when displaying tabular quantity/money data.
Numeric:	Y or N. If N then data is word-processed. If Y then just the numeric part of the data is extracted and presented with leading zeros suppressed.
Column total:	Y or N. If Y and if numeric, then all selected records are column-totalled with totals shown following the last selected record, in line with and in the same style as the corresponding field.
Two dec. places:	Y or N. If Y then numeric data is shown to two decimal places, otherwise as integer. Values with unused fractions are truncated rather than rounded.
Thousands commas:	Y or N. If Y then numeric data is shown with commas as for example 1,234,567 .
Filler if absent:	Where the target field is absent in a record, then three of these characters are used as a filler for the purpose of display. If you do not wish a filler to appear, then enter a blank here.
Leading symbol:	This applies to numeric treatment only, and allows a currency symbol to prefix the displayed value. Thus the data "1234" can be made to appear as "£1,234.00" for example.

Ruled Line

This item is purely for embellishment, adding that professional touch to your format. Ruled lines are drawn either across or down, and along the middle of a screen line or a screen column. Two lines meeting to make a corner can be made to stop exactly where they meet, so that neat boxes are possible. The full list of parameters are:

Across (Y) or down (N):	Y or N to select direction.
Mid-char ends:	Y or N. Y for neat corners.
Double thickness:	Note that vertical lines are thinner than those across, due to the mode 2 screen pixel make-up. A double-thickness vertical line will therefore match a single-thickness line across.
Start column:	The start character column of the top or left end of the line.
Start line:	Relative to the screen as a whole, the start line of the top left end of the line. The range is from 1 (top) to 25 (bottom); but in practice, keep within lines 2–22.

Length:	Given in character-equivalents, range 1–80.
How many:	You can draw several parallel lines using just one item. To draw a box for example, you need two items each showing 2 here.
Interval:	If “how many” is greater than 1, then this entry gives the character spacing between successive parallel lines.

We recommend that you experiment with this item to find its full usefulness.

Other format manipulations

While a format geometry is displayed, there are a variety of menu options, of which we have covered only [A] to alter, and [I] to insert. Other options are:

[E] Erase the displayed item. Geometry cannot be erased except by erasing the whole format — this is covered later. As with most erasures, [Y] is invited to confirm.

[N] Display the next item; if no more, resume with the Geometry item. Repeated use of [N] simply presents all the item questionnaires in rotation.

[P] Print all the format items. The listing so produced is a useful aid to locating your errors and is good documentation.

[X] Exit to the first format menu.

[D] Go directly to DISPLAY mode. This is a valuable means of testing a format as you develop it. When DISPLAY mode is so entered, [D] again returns to the same point at which you pressed [D] the first time, so that you can make immediate changes to the item.

Higher level format options

Of first format menu we have so far covered only [N] to initiate a new format. The other menu options are now covered.

```

New format.....N
Review format.....R
Erase format.....E
Copy format.....C
Exit to main menu.....X

```

[R] is used to examine and possibly change an existing format. You are asked to supply the reference of the format, and if this is found then the Geometry item is presented and further dialogue is as has just been described in “Creating a new format” etc.

[E] is used to erase a format completely. [Y] is invited to confirm.

[C] is used to copy a format. You are asked for the reference of the existing format and then for a new reference for its copy. This option has two uses:

- a) If a new format is required very similar to an existing one, then it can save time to start with a copy and then review and alter the copy.
- b) The only way to alter a format reference is to copy it and then erase the original.

[X] Exit to main menu.

DISPLAY MODE

This is where your file is viewed, and from where any changes to existing records must be made.

Displaying File records

Whichever records are **SELECTED** are those which will be displayed, as when for example you use main menu [D]. There must be at least one **FORMAT** established before [D] will work. If there are several formats, then the one used will be whatever was last used. Option [D] is available from other places in the program, for example the first **SEARCH** menu.

If you wish to select a format from a list of format titles, then main menu [C] gives you this opportunity. If you use [C] when there are no formats, do not panic, as [ENTER] will return to main menu.

The best way to understand the display options is to use them. Load **FILE2** and press [D]. Since all **FILE2** records are selected, and the last format used was reference 1 (yes, it remembers even when saving the file), the use of [D] will now show the following:

Summary of Business Assets

Description	Maker	Model	Value
Microcomputer, 64K RAM + 32K ROM	Amstrad	CPC 464	£199.00
Microcomputer, 128K RAM + disc	Amstrad	CPC 6128	£299.00
Disc interface and 1st drive, 3"	Amstrad	DDI-1	£149.95
Dot-matrix printer 50cps 80col	Amstrad	DMP-2000	£159.95
Executive briefcase	Antler	AT0109	£42.00
Wire paper clip	British Steel	BWC	£0.01
Answering machine	British Telecom	BT2836	£185.00
Photocopier, single-feed	Canon	PC-10	£650.00
String, ball of	IBM	BOS-Exec	£0.40
Executive jet aircraft	Lear	Cloud-Cuckoo	£5,200,000.00
Typewriter, electric	Olivetti	Leterra 36	£130.00
Dictation machine	Philips	510	£190.00
Coffee maker	Philips	HD5349	£30.00
Parcel scale	Salter	250P	£119.00
Microcomputer, 48K	Silicarn	Trumpspec	£129.95
Letter scale	Waymaster	375XL	£10.00
Totals:			£5,202,294.26

Top record = 0001 [H] for menu

File: FILE2 Records:0016 Selected:0016 Parents:0000 RAM used:02K from 64K

The report format reference is shown at top left, in reverse. The only clue to what to do next is the message window which has "[H] for menu" showing. Use [H] therefore, and you will see the HELP menu overlay the display. We show it here over a blank screen:

```

Next screen page.....[ENTER]
[Back]/Fwd 1-9 records..[-]digit
Highlight target record.....↑/↓
GOTO selected record number....G
First/Last selected record...F/L
Alter top or target record.....A
Erase target record.....E
Insert new record.....I
Copy target record.....C
Unselect target record.....U
Print all/single.....P/Q
Switch to another report.....R
Switch to adjacent report....+/-
Direct return to format mode...D
Direct exit to Search mode....S
Exit to main menu.....X

```

The menu options will respond without showing the menu, so the use of [H] is purely for learning or as a reminder. Press [H] a second time and the display is rebuilt without the menu. We now discuss the menu options. Do explore each one using the FILE2 example.

[ENTER] Advances to the next screen page. If there are no more records to show, it just shows the last record, like [L] does. When there are more records to show, the message window contains "[ENTER] for more ...".

[1-9] Advances the display by 1 to 9 records, or to the last if fewer.

[-] then [1-9] Takes the display back 1 to 9 records, or to the first if fewer.

[UP] or [DOWN] Highlights a particular record by reversing the colours of its record area (RA). Thus any record on the screen can be reached and we call the reversed record the TARGET record. If no record is so lit, the target is taken to be the top-most one on the screen. The target record is the one which is subject to options such as [A] to alter it. [UP] and [DOWN] are of no great use when the RA limits the number of records per screen page to 1 or 2.

[G] Displays starting at a particular record number. You are asked for the number and then the display is rebuilt with that record at the top. See the chapter "RECORD NUMBERING".

[F/L] Displays starting at the first or last selected record.

All the options covered so far are used to position the top record or to select a target record on the screen page. Note that the message window usually contains a reminder of which selected record is currently showing at the top of the screen, viz "Top record = nnn".

- [A] Enters ALTER mode to make changes to the target record. This is covered in more detail later.
- [E] Erases the target record, although a [Y] response is required to confirm this. If you press [E] by mistake, back out with any key EXCEPT [Y].
- [I] Inserts one or more new records immediately after the target record. This is covered in "Inserting New Records".
- [C] Copies the target record, i.e. inserts a duplicate record. [Y] to confirm.
- [U] Un-selects the target record. This does not erase it, but just makes it temporarily ineligible for display.
- [P] Prints the selected data in the current format, starting at the top-most displayed record. This is covered in more detail later.
- [Q] Prints the target record only.
- [R] Switches the display to a different format; you are asked to supply the new format reference. If it does not exist, the request is ignored.
- [LEFT] / Switch to a different format, but without asking which. They simply select the next one lower [LEFT], if any, or the next one above [RIGHT], if any. You can regard two formats as being left and right halves of a 160-column format and flip between left to right using these keys.
- [RIGHT]
- [D] This key will only respond if DISPLAY was reached via FORMAT mode, and its purpose is to return to format mode at the same point where it left it. The sole use is for the developing/debugging a format.
- [S] Exit to SEARCH mode directly. Equivalent to [X] then [S].
- [X] Exit to main menu.

That summarises all the display options. Some of these are described more fully elsewhere.

ALTER Record

To alter an existing record, you must first enter DISPLAY mode and make the record the TARGET as described above. Then use display option [A], which then shows the following menu:

Microcomputer, 48K	Sillicorn	Trumspec	£113.00
Letter scale	Waymaster	375KL	£129.95
			£10.00
Totals:			£5,202,294.26
* ALTER Record * I:insert E:erase A:alter R:raw data Other:exit			
File: FILE2 Records:0016 Selected:0016 Parents:0000 RAM used:02K from 64K			

This invites you to do one of:

[I] to insert a field not yet present in this record.

[E] to erase a field from this record.

[A] to alter (edit) a field present in this record.

[R] to clear the screen and re-display the record data in the RAW state, and then await further instructions.

II

Summary of Business Assets

Description.....: String, ball of
 Maker.....: IBM
 Model.....: BOS-Exec
 Serial Number.....: 1113-465A
 Replacement Value.: .40

Use of [I] or [E] or [A] asks for the data reference, for example thus:

Parcel scale	Philips	250P	£30.00
Microcomputer, 48K	Salter	Trumspec	£119.00
Letter scale	Silicarn	375KL	£129.95
	Waymaster		£10.00
Totals:			£5,202,294.26
Data refs	D: Description	M: Maker	T: Model
	S: Serial Number	V: Replacement Value	

You can back out with [ENTER], otherwise the following happens:

Insertion checks that the chosen field does not yet exist and then invites you to supply the data using the standard text editor. On completion of the data the record is re-displayed, and stays in ALTER mode awaiting further changes.

Erasure checks that the chosen field is present, then awaits confirmation [Y] before erasing the field. On completion, the record is re-displayed and stays in ALTER mode.

Field Alter checks that the chosen field is present, then pulls the data into the standard text editor window for your attentions. On completion, the record is re-displayed and stays in ALTER mode.

Use of any key except [I, E, A, R] will exit ALTER Record mode and resume DISPLAY mode. If [R] has not been used, the display screen is undisturbed except for the altered record. But if [R] has been used, switching to RAW data, DISPLAY mode is resumed with the target record now at the top.

It is quite possible to erase/insert/alter fields which are not even shown in the current display.

RAW Data

Raw data is shown exactly as keyed, preceded by its data name. For example, line-break characters are visible. It is possible that for large records with many and/or long fields, one screen is not enough to show all the raw data. In this case, "[ENTER] for next page" invites you to view further raw data, otherwise use [I, E, A] as required immediately — even though the menu is momentarily obscured.

Where the record is already shown in RAW state, use of [R] has the effect of re-displaying the raw data from the start, useful when the data occupies more than one screen page.

Notice that when altering a field, the text editor operates on the data in the raw state also.

Word Processing

The "Record data" format item specifies not only the line and column where a data field is to be displayed, it also specifies a width and depth. In most cases perhaps, you will use a depth of 1. But consider a postal address, or a detailed part description — both made up of many words. Given a display area two or more lines deep, MASTERFILE will minimise word breaks and present the text the way a typist might do it. What this means is that when you key your data texts, you need not worry about the spacing and only a single space between words is needed.

In general MASTERFILE starts a fresh line if there is one, and if the next word is too long to fit in the current line, and if the current line has already been started. Of course if there simply is no room, then word break or truncation is inevitable.

The only word delimiters are space, sort prefix "_" and line-break "_". In the case of the last two, these are translated to blanks. Other punctuations by themselves are not sufficient to indicate a word end; thus the following would be treated as a single long word:

Baubles,Bangles.Beads(glass)

LINE-BREAK is a special character (the underscore, shifted zero) which will force a new line if there are more lines to be used within the space given. Thus for example, if we wish to display a list of items one under the other, we can key it as:

Sugar, 2 oz_Two egg yolks, whisked lightly_Butter, 4 oz_Raisins, 2 oz

If this data is displayed in an area 4 or more lines deep, and say 35 characters wide, it will appear thus:

**Sugar, 2 oz
Two egg yolks, whisked lightly
Butter, 4 oz
Raisins, 2 oz**

Perhaps the most valuable use of line-break is in addresses where you wish to present them in address label form. Thus the address:

57 Trap's Hill_Loughton_Essex IG10 1TD

if displayed in an area say 30 wide and 4 deep, will be presented as:

**57 Trap's Hill
Loughton
Essex IG10 1TD**

The same address if displayed in an area 60 wide but just 1 line deep will show:

57 Trap's Hill Loughton Essex IG10 1TD

If the display area is just 20 wide and 1 line deep, then the display is truncated, as follows:

57 Trap's Hill Lough

You can even show a word written vertically by specifying a display space just one character wide and several deep!

Finally, note that word processing as just described does not apply to headings, nor to data where numeric treatment is specified.

Numeric Data

The program recognises negative values — provided the **first** character is the minus [−] sign. Otherwise, values whether signed or not are taken to be positive. Totals are true algebraic values, and can themselves be negative. Any data can be treated as numeric, but totally unsuitable text assumes a value of zero. Thus when requested to treat data as numeric, whether for display, search, sort, the program extracts whatever it can. Thus for example ...

35mm	yields	35	or	35.00	
\$100.128		100		100.12	(no round-up)
−49.336		−49		−49.33	
48 @ \$1.50		481		481.50	(so beware!)
CPC 6128		6128		6128.00	
DAVID		0		0.00	(what else?)
+10		10		10.00	
20−3*4		2034		2034.00	(no expressions please)

We advise that money amounts are keyed as pure numbers, but any extraneous currency signs or spaces, and character suffixes are harmless. Numeric display options are limited to integer or two decimal places, without rounding.

RECORD NUMBERING

Data records have two **implicit** numbers. One is **physical**, the other is **selected**. Neither of these numbers takes any file space, rather they are computed and displayed in flight as required.

The physical record number is simply its position in the file. If an earlier record is erased, then all following record numbers can be thought of as being instantly reduced by one. To display a physical record number, use data reference "!" . To search on this number, again use "!" — e.g. to select the first 20 records:

SZS!L!21 [ENTER]

(Yes, two exclamation symbols: the first is data reference, the second prefixes a numeric argument — otherwise we'd get records 100,101 etc as well. See "SEARCH MODE".)

Selected record number is rather more temporary, being the position of a record relative to only the selected records. Thus the first selected record is 1, the second is 2, and so on. The data reference used to display this number is the number-sign symbol [SHIFT 3]. It is meaningless to SEARCH. When in display mode, [G] can be used to position the display to any selected record number. Thus "G1 [ENTER]" is equivalent to [F], and "G9999" is equivalent to [L].

DISPLAY shows the selected record number of record at the top of the screen.

Record numbers cannot be exported, cannot be sorted, cannot be shown or altered during record ALTER, cannot be accessed from User Basic GETD. They can both be printed. Only physical record number [!] can be searched. Do not enter these special data references into the data names list.

PRINTED OUTPUT

[Graphic copy of the screen to an Epson-compatible printer is described in the chapter "Hi-resolution Screen Copy". For all other purposes, the printed output is ASCII text, suitable for all printers. Data Names can be listed on the printer, and so can the format items. Those print functions are described in the "Data Names" and "FORMAT" chapters.]

The main use of the printer is to provide hard copy of your records in the same style as DISPLAY mode. This printing is one of the DISPLAY options, initiated using [P] when in DISPLAY mode. Printing starts immediately, and prints from the current page to the end of the selected records. Printed records are shown on the screen, one at a time. Holding down [ESC] will terminate after the current record being sent to the printer.

If the printer is not ready when [P] is used, the program will wait until either the printer is made ready or you press [ESC] to abandon.

To prime the printer in respect of such things as line feed distance, character font and letter spacing, make use of the main menu [Q] option. It is not possible to embed printer controls within the text.

Printed output differs from the screen format in a few respects. The title line is not printed, but all other headings are. Any reverse-colour fields or headings are shown in normal form, and any ruled lines are suppressed. The left-hand margin is as you specify in the format GEOMETRY item. The form's depth (FD) is also as specified in the GEOMETRY. The number of records per page is the integer part of $(FD - HAD - 6) / RAD$, which is a fancy way of saying that you get as many records per page as will fit, allowing HA on every page, and 6 clear lines between pages. HAD is the Heading area depth, and RAD is the Record area depth as given in the GEOMETRY.

When a format is first created, the default form's depth is 66, corresponding to 11" forms at 6 lines per inch — a common standard.

For continuous printing, a form's depth of 99 is taken to mean "infinite page". With this specified, there are no page gaps and no repeat of the HA. This would be typical of address labels. For example, if your labels are every 1.5 inches on a roll, and you print at the usual 6 lines per inch, then specify HAD=0 RAD=9, and form's depth of 99. The labels will display as two per screen page, but will keep perfectly in step with the labels when printed. If you are using 2" interval labels, then set RAD=12.

There is no direct way to print more than one label across the form.

Unless FD=99, or [ESC] is used to abandon printing, then after each page (or incomplete last page) a **form feed** command is sent to the printer to advance ready for the next page. This command is ASCII code 12. But before printing starts, the sequence ESC "C" nn is sent to the printer, where nn is the form's depth in lines. This is an Epson-standard convention and serves to tell the printer how much to advance the paper when **form feed** is sent. If this is not suitable for your printer then the CUSTOMISATION notes tell you how this can be suppressed.

Single Record Print

To print just a single record (the target record), display option [Q] is used. This option prints just the Record Area contents of the target record. Any HA text is ignored. Option [Q] is useful where one or more records require to be printed on demand without having to isolate them via SEARCH. The same use of [ESC] applies as has been described for option [P].

Wide Reports

The normal limit of print width is margin plus 80, since the data is copied from the 80-column screen. But if you want a wider printed report, then you can print two display formats side by side, giving up to 160 printed columns. The only limitation is that no data can straddle the "join" line. Headings can cross the join but only by defining them in two pieces.

To tell MASTERFILE that two formats are connected for printing purposes, use the "Connect code" in the GEOMETRY. In one format use "L" to signify the left side, and in the other use "R" to signify the right side. Also, the two formats must have adjacent references. For example, if the left side is format 3 then the right must be format 4.

If you have a printer which can handle 132 columns in condensed mode, then you will be limited to 52 columns within the right-hand format.

You must ensure that the two RA depths are the same.

Deep Reports

Whilst an RA depth can be up to 99, only the first 21 lines of the RA can display or print. If you wish to spread one record down more than 21 lines, then again one uses two formats. This time, connect two adjacent formats using connect codes of "T" for the top, and "B" for the bottom. When the top format is used for display and then print is requested via [P], the RA of the "B" format is printed after the RA of the "T" format. The form's depth is governed by that specified in the "T" geometry form's depth, and the HA if any of the "B" format is not printed.

A double-width report cannot also be double-depth.

Page Numbering

If a heading begins with a number-sign [SHIFT 3] then for printing purposes it is not printed as shown, but instead is treated as a 3-digit page number starting at 001, and increased by 1 for each occurrence. If such a heading is displayed in the HA, of which there is one HA per page, then this can be taken as a page number.

This special processing does not recognise number-sign embedded, thus if you attempt to print a heading of "Page ###" this will not translate into page numbers. Instead, use the word "Page" as a separate heading from "###".

SEARCH MODE

With small files, it may be perfectly acceptable to keep all records **selected** so that the entire file is displayed when [D] is used. But with larger files, it is cumbersome to browse through the whole file and the use of the human eye for retrieval is not ideal. Thus one should use MASTERFILE to SEARCH the file for the records in which you are interested. For example, if you wish to find all the "CHOPIN" works in your music file, or all addresses containing "LEEDS" in your client file, or all outstanding debts over £100, MASTERFILE can perform this discriminatory retrieval and present you with just those records which match your criteria. Matching records are made **selected**, the rest **unselected**.

Searching the file

SEARCH mode is available via [S] either from main menu or from display mode, and offers its own menu as follows:

Search the file

```

Un-select all records.....Z
Select data matching [OR].....S
Un-select non-matching [AND]....U
Select all parents.....P
Un-select all parents.....Q
Children of selected parents....C
Invert selection.....I
Display selected records.....D
Exit to main menu.....X
  
```

When starting a fresh search, start by un-selecting the whole file. This is done using [Z], and reflects with "Selected:0000" in the file statistics panel.

[P] selects all PARENT records, and [Q] un-selects all parents. Option [C] selects all CHILD records related to the currently selected parents. These three options are applicable only to relational parent-child files.

The most frequent kind of search is where we wish to select records on the basis of their contents, and to do this we use options [S] to select, and [U] to un-select. When [S] is used, only un-selected records are examined, and they are made selected if they match, while with [U] only selected records are examined and they are un-selected if they fail to match. Consequently, the aim of [S] is to increase the number of selected records, while [U] will try to reduce the number of selected records.

Having chosen either [S] or [U], you are invited to indicate which field is to be examined, and to help you choose, the standard "Data refs" prompt list is offered, for example:

Data refs	D: Description	M: Maker	T: Model
	S: Serial Number	U: Replacement Value	

Just press the data reference key of the target field. You are then presented with a menu of comparison options, as follows:

```

Equal to.....E
Lower than.....L
Greater than.....G
Unequal to.....U
Present.....P
Absent.....A
String scan.....S
Previous menu.....X
  
```

Comparison options [E], [L], [G], [U] and [S] all require an **argument**, which is text which you give to be compared with the data in the chosen field.

Argument:

We will return to the data comparisons shortly, but first we can explain the remaining comparison options. It is possible to choose records on the basis that they contain or do not contain a particular field, regardless of the data value. Option [P] matches records where the chosen field is present, while [A] matches where the field is absent. For [P] or [A] therefore, no argument is requested.

Now we will examine the comparison options in more detail.

[E] tests for equality by comparing your argument with the start of each field. Thus for example, if we give an argument of "FRED" then it will consider as EQUAL all records whose target field is "FRED", or "Freda", or "Freddie", but not "Winifred" or "Nina and Frederic" or "FR". Likewise if we give an argument of "A" then it will consider as EQUAL all records where the target field begins with "A" or "a". We can see that two special rules operate:

- a) Upper and lower case are considered equivalent.
- b) The length of the comparison is that of the length of the argument.

There are two special ways of modifying the argument. If you wish the comparison to be case-specific, where "A" and "a" are regarded as different, then simply key a "↑" in front of the argument. For example, "↑ Fred" will match "Fred" and "Freda", but not "FRED" and not "FreDa". Note that the "↑" prefix is the key to the left of the CLR key, and not the [UP] key.

The other special argument treatment is where you prefix with an exclamation symbol, "!". This signifies a **numeric** comparison. Thus an argument of "!20" will consider as **equal** the fields "20", "+20", "\$20.00", while field "2000" is considered unequal. This distinction is more significant where the comparison option is L or G. Thus for example, the field "20000" is **less than** argument "9", but **greater than** "!9". The reason that "20000" is less than argument "9" is that the first character of the "20000" is a "2", which is lower than the first character of the argument, "9". Remember that the MASTER-FILE does not "see" data as numeric unless you tell it to treat it as such.

We have exhausted [E] comparison option; [U] is the converse of [E] and needs no further explanation. [G] and [L] are self-explanatory. Note that if the target data field is absent from a record, then that record fails to match even if the comparison option is [U], unequal.

Now we come to the most powerful of the comparison options, [S], which performs a STRING SCAN. By this we mean that records are matched if the argument is found **anywhere within** the target field. Thus a string scan for "FRED" will identify fields containing "Nina and Frederick", "Manfred Mann", "Winifred", as well as "Freddie". Again, the match is case-independent but can be forced using the special argument prefix of "↑".

Another possibility with [S] option is that if the target data reference is given as "*", then this is taken to mean "any field". Thus string scan can be made global in scope. This is so useful that we suggest you program one of the function keys to do most of the work. For example, to program [f9]:

160 KEY 9, "XSZS*S"

Thus when [f9] is pressed the following happens:

```

X  exists from Display to main menu, else does nothing
S  search
Z  un-select all records
S  select
*  any field
S  string scan

```

You then have the "Argument" prompt, where you can key the data you are searching for, and [ENTER]. Then [D] to display the matched records.

All searches return to the first search menu, which offers you the choice of qualifying the search further, or exit either [X] to main menu, or [D] to display the selected records. The result of a search is reflected in the file statistics panel where "Selected:nnnn" shows how many records are matched. If this shows zero then clearly the search has failed to make a match.

The only search menu option not yet covered is [I]. This has the effect of selecting all the un-selected records, and un-selecting all the selected records and so it is said to "invert" the selection. Option [I] is also available from the main menu directly.

Searching by several criteria

Suppose we wish to pull out all records which have "Bach" OR "Handel". We would first use [S] etc to identify "Bach" records, and then without using [Z] we would use [S] etc again to identify the "Handel" records.

On the other hand, suppose we wished to find all records containing "Chopin" AND "Nocturne", i.e. not all the Chopin works, just the Chopin Nocturnes. We would first use [S] etc to select all "Chopin", and then without using [Z] we then use [U] to reduce these to the "Nocturne" records.

In order to remind you which options to use in composite searches, the menu shows "[OR]" against the [S] option, while the [U] option shows "[AND]".

Examples of Search

In the following examples, we assume that the file has been loaded and that the main menu is showing. Do not key any spaces, we have shown gaps just for clarity.

- a) In a file of addresses, find all records containing the word "London".

SZS*S London [ENTER] D

This will indeed work, but note that it will also identify "14 London Road, Cambridge". It would also identify "Londonderry". Also since we have chosen to make use of the global "*" data reference, we may also identify "Mr and Mrs P London". At least this last problem would be solved by using a specific data reference. If the address is in field "A" then a more accurate search would be:

SZSAS London [ENTER] D

- b) In a file of music titles, where composer is field "C" and title is field "T", list all the Chopin Preludes:

SZSCS Chopin [ENTER] UTS Prelude [ENTER] D

This is a two-pass search. First, we select all records whose composer is "Chopin" and then we retain only those where the title contains the word "prelude". We could have used [E] instead of [S] comparison type, thus:

SZSCE Chopin [ENTER] UTE Prelude [ENTER] D

However, any entry with "F Chopin" as composer would then fail to match. This illustrates the advantage of using string scan.

- c) In a file of personnel where field "S" is salary, list all records where salary is in the range 9000 to 11999 inclusive:

SZSSG !8999 [ENTER] USL !12000 [ENTER] D

Again we use a two-pass search, this time to match to a range of values. Note the numeric indicator "!".

- d) Where records are numbered via field "!", select the first 50 records:

SZS!L !51 [ENTER]

Although record numbering is implicit, we can still search on record numbers just as if they were actually present in every record. The implicit physical record number has the data reference of "!" . In our example we have used "!" twice — first being the data reference, the second being the numeric prefix to the argument. Without the latter we would also have selected records 100, 101 etc.

- e) In a file of computer dealers, list all records which do not contain the word "Amstrad" in the product range field, data reference "P".

SZSPS Amstrad [ENTER] ID

At first we have had to do the opposite, and search all the "Amstrad" dealers. But then we have used [I] to invert the selection. Thus we have surmounted the problem that there is no such search as "string scan unequal".

How to store Dates

Here we have a well-known computing problem. This is because the most useful way to store a date is not the way people like to see it. MASTERFILE has no special logic for dates, which you can enter any way you like. But think about it first ...

"28th September 1986" is rather long, you would probably prefer "28 Sept 86". Now, suppose you wanted to find all the September records: you can do this with a string scan looking for "Sep". No problem so far; but now suppose you want to find all records **earlier** than September 1986. This is not possible when dates are held the "human" way. When we say "earlier than" or "later than" we must translate this to "less than" or "greater than". Now, when we compare numbers on this basis, or text strings for that matter, this is on the basis that the left-most part of the data is the most important. Thus for dates, the year is the most important and so to search dates we should store them as year first, then month, then day. Further, since month names begin with JFMAMJJASOND, we must instead use a number, 01 to 12.

And so, our "28th September 1986" date is more usefully stored as "860928", which is both compact and allows more rigorous date searches. You can if you prefer store it as "86/09/28" or "86 09 28" or "86-09-28", provided you use a consistent scheme. We have suggested the yymmdd pattern, with some variations, but for some applications maybe you only need one year digit, or even just month and day. Other patterns are yyww (week number), yyddd (day number), yymin. For days and months in the range 1-9, enter these as 01-09.

With dates held as for example yymmdd, almost any kind of search is now possible. For example, assuming dates are held in field "D", we can find the following:

Dates earlier than May 1986 : **SZSDL 8605**

Dates from April 84 to March 85 inclusive : **SZSDG 8403 UDL 8504**

All 1986 records : **SZSDE 86**

SORTING THE FILE

It is possible to re-arrange the records in a file so that they are in ascending or descending order in respect of one or more of their fields. This process is known as SORTING, and is initiated using main menu [O] — the letter, not zero.

The first prompt is for the data reference of the sort key field. For example, if you wish to sort a file into name order, where name is stored in field N, then press this data reference [N].

A short menu then asks you to indicate whether [A] ascending, or [D] descending sequence is desired.

Finally, another equally short menu asks whether key treatment is [C] character or [N] numeric.

The sort then commences, and displays a progress count of the number of records sorted. For very small files, this may be too brief even to read. For longer files the sort can take several minutes. Total duration can be estimated by timing the first ten records, dividing by twenty, and multiplying by the number of records in the file. The reason for this odd formula is that the sort speeds up as it proceeds. Numeric sorts take rather longer than character sorts. If you wish to abort a sort, just hold down [ESC].

The sort completes with BEEP to wake you from your reverie, then resumes the main menu.

Sorting takes place on the whole file, regardless of records being selected or not.

If the key field is absent from a record, then it is deemed to have a low value, which for ascending character sorts such records to the beginning of the file. If two or more records have the same key, their respective positions are unchanged. For the purpose of a sort, key fields containing differences only beyond their 25th character are considered equal.

For numeric sorts, negative data is deemed to be low, and the more negative they are the lower they are. Thus for example, the following values are numerically in ascending order:

-100 -60 0 20 21 100

Absent or non-numeric data is treated as if it had a value of zero.

Embedded Sort Keys

Special consideration is provided for names such as "Mr R F Smith", where we would like the file to be in SURNAME sequence, but wish to style the name for polite address labels. After all, we do not wish to write to "Smith, R F", and yet neither do we wish salutation and initials to get in the way of the sort key. MASTERFILE offers a compromise: If a "\ " is present in a field, the sort assumes that the key is what follows, rather than taking the whole field. Thus to sort Mr Smith among the S's and not the M's, we encode him as "Mr R F\Smith". Don't worry about the "\ " character, since this is disguised as a space when the record is displayed or printed.

This scheme is a compromise, since any initials do not contribute to the sort, and if there are several "Smith" records, their mutual sequence will not be affected.

Multiple Sort Keys

If you need to sort one field within another, then you need to make two sorts. First sort by the low-order field, then again by the high-order field. This has the effect that where the high-order field has duplicate keys, the low-order key will control their sequence.

Relational Files

In a relational file, display speed is reduced when the parent data has to be sought for use in a child. Since parent records are sought by reading up the file from the beginning, the best place to keep parents is all together at the start of the file. Sorting by data present only in the child records will achieve this, and an obvious choice would be the child-link field [1]. If the parents themselves are required in a particular order, then sort the file this way first, then again by the child data.

FILE STATISTICS

Most of the time, the bottom line of the screen shows in reversed colours the FILE STATISTICS. These comprise:

File: xxxxxxxx	1st 8 characters of the file name
Records:xxxx	the number of data records in the file
Selected:xxxx	the number of records currently selected
Parents:xxxx	the number of parent records
RAM used:xxK from 64K	how much RAM the file occupies

Every record in the file is either **selected** or un-selected. Selected records are eligible for display and other processing. To draw the analogy of a card-index, selected cards are those which are pulled up so that you can read what is written on them. MASTERFILE offers very powerful SEARCH options to select or un-select records in the file. Newly created records start life as selected.

PARENTS are special records which contain data accessible to other records, called CHILD records. We leave fuller explanation of this concept to a later chapter. For non-relational files, "Parents:0000" will appear.

"RAM used" tells you how much memory the file occupies, rounded to whole K above. The maximum file size is 64K, where K=1024 bytes. Any attempt to overflow will warn with "FILE FULL [ENTER]" and abort the last operation, but otherwise leaving the file intact. The "RAM used" figure also informs how much disc space the file will occupy.

```
File: MUSIC   Records:0042   Selected:0039   Parents:0003   RAM used:02K from 64K
```

SAVE/LOAD/MERGE ETC

Main menu [T] takes you to another menu which offers functions concerned with disc (or cassette). This menu is:

Load/Save/Merge/CAT/Eraser

```

Save file.....S
Save selected records only.....P
Load file.....L
Merge from another file.....M
Select tape.....T
Select disc/drive.....D
CAT.....C
Erase all .BAK files.....B
Erase a file.....E
Exit to main menu.....X

```

[S] saves the file which is in RAM. You are asked to supply a file name, but [ENTER] by itself will default to the present name as shown in the file statistics panel. If no file suffix is given, then ".BIN" is assumed. [ESC] may be used to back out of the save, but not once you have pressed [ENTER]. File save is complete, in that all data names and display formats are saved as well as your data records. If you are saving to cassette, then you are asked for the data rate, 0=slow, 1=fast.

[L] loads a file, and you must supply a file name even if loading from cassette. [ESC] if you wish to back out. If the file type is ".BIN" then you need not key this. Any file already in RAM will be lost, so be sure to save this beforehand if necessary. On normal completion of a load, the main menu is resumed and the file statistics line are re-built. This may take a second or two. If the file loaded does not look like a MASTERFILE file, the program will warn with "Bad File" and revert to the empty "NOTNAMED" file.

Note that the [L] function is also available directly via the main menu.

[D] Selects a disc drive, A or B. In fact, [D] by itself is exactly equivalent to BASIC's |DISC command. You are prompted for A/B, which perform the equivalent of BASIC's |A and |B. [ENTER] instead of A/B is also allowed.

[T] Selects the cassette interface and performs the equivalent of BASIC's TAPE command. If you press this by mistake, you may not notice until save/load when you will see a message such as:

Press (REC and) PLAY then any key:

If this happens unexpectedly, just [ESC] then [ENTER] then use [D] to switch back to disc, and repeat the operation you were trying to do.

[C] lists the disc catalogue. If tape is selected then [PLAY] the cassette but note that tape CAT is endless, terminated only via [ESC]. The catalogue lists in three neat columns. If there are more than 48 files then some names will scroll off, harmlessly. All the save/load menu keys may be used while the catalogue is still on the screen, so that you can check your spelling as you key in a file name.

[P] is a special type of save which is like [S] except that any un-selected records are dropped. This is therefore a PARTIAL save, only the SELECTED sub-set of the file being saved. As with normal [S] save, all data names and formats are saved too. Since [P] is potentially dangerous, you are asked to confirm this with [Y], any other key is a "back-out". Although un-selected records are not saved, they are still retained in the RAM version of the file, so one can still follow this with a full file save via [S].

Data from one file can be merged into another file, using the [M] option. [M] is a non-destructive kind of file load, in that what is already in the RAM file is left intact. You are asked for the file name of the file to be merge-loaded, and on successful open of this file you are given another menu of three options:

[A] reads all data records and appends them to the end of the current file in RAM.

[S] appends only the SELECTED records from the incoming file.

[F] copies a single format from the incoming file into the current file in RAM.

The combined size of the resulting file cannot exceed 64K, and any overflow is notified and the file is left intact but with some of the incoming file data not merged.

The [A] and [S] options bypass the data names and formats of the incoming file. It follows that if you merge a file without a file already established in RAM, you will not be able to display it since it has as yet no formats (or data names). Re-save of such a file is a way of shipping "data only" files, although DATA EXPORT is probably better suited for this purpose. DATA EXPORT is the subject of a later chapter.

In the case of [F] option, you are asked to supply the REFERENCE of the format to be merged, and this must not already be in use in the current file. If it is already in use, then you can first rename it via copy/erase as described in the FORMATS chapter.

The selective save and merge capabilities of MASTERFILE provide the means to ship data and even formats from one file to another. Of course, merge assumes that you have made consistent use of data references in the files being combined.

Save/Load menu options [E] and [B] offer "house-keeping" functions to erase unwanted files from disc. By "files" we mean any component listed in the catalogue, not just MASTERFILE files. Option [B] is a handy way to erase all ".BAK" files, while [E] is a more selective file erase.

[E] asks you for the name of the file to erase, but accepts the usual "wild-card" notation too. For example, if you use [E] then "ABC?????.*" then all files beginning with "ABC" are erased. Note that file type must always be specified. For example, to erase "ABC.BIN" this full name must be keyed, or else "ABC.*".

You may use MASTERFILE to perform house-keeping on discs which have no connection with this program.

You can use transfer a MASTERFILE file from one disc to another simply by loading it, changing discs, and saving it again. Thus one can perform file back-up tasks without leaving the MASTERFILE environment. However, if you have many files to copy, CP/M DISCKIT3 or PIP may be preferred.

The last menu option is [X], which returns to the main menu. File load returns to main menu automatically, but [X] must otherwise be used to leave the save/load environment.

Not all users may need the functions described here. USER BASIC may well be beyond the reach of those who have no knowledge of BASIC.

DATA EXPORT

A MASTERFILE file is not directly comprehensible to other programs, so we have provided an EXPORT function to write an all-ASCII extract from selected records. The file so created may then be read by other programs, such as TASWORD or PROTEXT. A very powerful use is to provide "mail-merge" data for TASWORD 6128 or PROMERGE.

Each selected file record creates an export record, made up of one or more fields which you specify. Each field in the export record can be followed by CR or CR+LF, or it can be wrapped in double quotes with comma separators. Linebreaks within your data can cause a field to split into two or more fields. Data can be stored "naked" or prefixed with a two-byte identifier of & and data reference letter. End-of-record is sent as another CR or CR+LF. End-of-file can be sent as a code 26, or not.

To give some idea of the range of formats, consider an export record to contain "N" data of "Mr A\Jones" and "A" data of "49 High Street_Epping". We can send it in the following ways:

```
Mr A\Jones[CR] [LF] 49 High Street_Epping[CR] [LF] [CR] [LF]
&NMr A Jones[CR] &A49 High Street[CR] Epping[CR] [CR]
"&NMr A\Jones", "49 High Street_Epping"[CR] [LF]
"Mr A Jones", "49 High Street", "Epping"[CR]
```

Note: [CR] means code 13, carriage return; [LF] means code 10, line feed.

Data is exported via main menu [E]. If necessary however, one must select the output tape/disc/drive beforehand via the Load/Save menu.

The data formatting is chosen by giving simple Y or N responses to the following questions:

Data identifiers to be sent ? Y/N

Reply of Y prefixes each data field with &n where n is the data reference.

LF as well as CR ? Y/N

Data and record delimiters may be CR or CR plus LF. Reply Y for the latter.

Remember the "invisible" data, line breaks () and sort key marker (\) ?. These can be sent unchanged or edited. Editing replaces "\" with space and the line breaks with CR (and LF if chosen). The prompt is:

Convert line breaks etc ? Y/N

To choose comma-delimited format, answer Y to the following:

Comma delimited ("...", "...") format Y/N ?

Comma-delimited format will still yield "" even if data is absent and no default text supplied. Any double quotes (") met in comma-delimited data will be converted to single quote (').

The next question is:

Soft EOF to end ? Y/N

The export file can terminate with "soft end-of-file" code 26, or not. If BASIC is used to read the file, choose Y. Other programs may not mind which, but we understand that for TASWORD you must choose N.

Please note that when exporting to TASWORD for data-merge purposes, the replies to the above will be Y Y Y N N. For direct loading into TASWORD as a text file, the responses will be N Y Y N N.

Next, EXPORT asks which data fields are to be extracted. Any number of fields can be exported. Further, where data is absent a specific piece of text can be substituted, e.g. "The Sales Manager". Each field is prompted using the standard DATA REF prompt. Only data references present in the data names list are acceptable. After giving a data reference, you are asked for the optional text to be sent where data is absent:

Default text if no data:

Immediate [ENTER] if not applicable, or else enter the phrase of your choice.

The data reference prompt repeats until you reply [ENTER]. [ESC] aborts the entire export mode. Data names and default texts are listed on the screen.

The final prompt is:

Give file name for output:

[ESC] or direct [ENTER] will back out of the export operation, otherwise give the name of the export file about to be written. The file is written and main menu is resumed when you acknowledge the "COMPLETE" notice.

A simple BASIC program to read and display an exported file would be:

```
10 OPENIN"filename"
20 WHILE NOT EOF
30 LINE INPUT #9,a$
40 PRINT a$
50 WEND:CLOSEIN
```

TASWORD-D data merge does not allow non-alphabetic data identifiers. This can be a problem if you wish to export the relational keys as identified by > and ↑. So we have provided a means to alter these in flight to any suitable value, such as lower case letters as permitted by TASWORD-D. To alter > and/or ↑ identifiers see "CUSTOMISATION" chapter.

RELATIONAL FILES

We started by defining a file as being a set of records of similar structure, each record being otherwise independant of other records in the file. But now we can explain how with MASTERFILE one can take a different approach, where we can exploit the RELATIONAL capabilities of the system.

Consider an index file of music titles, where we wish to file track title, performer, and album title. If one takes a typical modern long-player album, it may have a dozen or more tracks, many if not all by the same performer.

One could create one large record per album, with data names for album title and performer, then a whole series of data names for "1st title", "2nd title" and so on. This would indeed be a compact way of storing the data, but presentation and retrieval options would be rather hampered. For example, if one wants just to list all titles with the word "BLUE" in it, any matching record would also present all its other titles regardless.

Then what if some tracks are by a different performer? Do you have "Performer 1", "Performer 2" and so on, or do you combine "Title/Performer 1", "Title/Performer 2" etc? Any of these methods seems doomed to untidiness!

The simpler method is to have one track per file record, each containing just three fields: Album title, track title, performer. Retrieval and display are now simple and efficient. But imagine the huge duplication of data involved. The duplication (of album title, and often of performer) will be inefficient in two respects: your keying time, and sheer file size.

The solution is to create a RELATIONAL file. A relational file is one where some or all of its component records "relate", by which we mean "share data". In terms of the music index problem just described, for any music album we need store the album title just **once**, and the main performer just **once**. This data we store in a PARENT record. Then for each music track we create a CHILD record into which we enter just the title, and maybe the performer.

That is not quite the whole story, since we need to be able to indicate which child records belong to which parent record. The answer is simple: we just invent a short but unique identifying key for each parent, and store it. Then we put the same key value into each of its child records. MASTERFILE then has all it needs to connect child with parent.

Two special data references have been set aside for the fields which hold the key values. These are [**>**] and [**↑**]. A record which has [**>**] data in it is called a PARENT record, while a record with [**↑**] data present is called a CHILD. You can give whatever data names you like to these, but for now let us refer to them as [**>**] PARENT LINK and [**↑**] CHILD LINK.

Now we come to the all-important DISPLAY rule:

When a child record is displayed, any data required by the format is sought from the child in the normal way. But if the data is absent, then it is sought instead from the parent record, regardless of where the parent is or whether it is selected or not. If the parent does not have the field either, then the default filler as given in the format item is used.

Other rules are:

- a) A child can have only one parent.
- b) A parent can have any number of children.
- c) Only two "generations" are supported.
- d) It is not useful to have both parent link and child link in the same record. A record is either parent or child, not both.

The file "MUSIC" on the disc illustrates the relational approach, and we suggest you explore this thoroughly.

Ordering the Data Names

Since one usually needs more child records than parents, the data names are best arranged so that the parent data names follow the child names, and the first parent name is the parent link. Then the best use can be made of [ESC] when inserting new records. When a new child is added, follow the prompts until the "Parent Link" comes up, then [ESC] to end. When inserting a new parent record, start with [ESC] to skip up to the parent link and then key the parent data.

In some situations you may wish to insert "parent" data into a new child record, in which case either [ENTER] to bypass individual parent prompts to reach it, or else use [ESC] to skip the data names then use [I] to insert the data while the ALTER Record mode is offered.

MUSIC Example

Look at the MUSIC example file, and see how we have arranged the data names as follows:

```

↑:Child link
T:Track title
>:Parent link
P:Performer
A:Album title
  
```

PICK UP ONE OF YOUR OWN MUSIC ALBUMS AND STORE ITS TITLES AS FOLLOWS:

At main menu press [A].

The first record you will insert will be the PARENT, so where the prompt says "Child link", just use [ESC]. You then see "Parent link". Now, think of a simple two- or three-letter abbreviation of your album, but avoid SM, AP, AT since we have already used these. Key in your chosen album code and [ENTER]. You are now prompted for the performer. Enter the main performer's name. You are then asked for the album title, so give it. That exhausts the data name prompts, but then you are invited to make any last-minute changes via ALTER Record menu; if there are no adjustments needed, just [ENTER].

That completes the parent record. Now you are invited to use [A] to insert another record. Do so, and now for each track or title on your music album:

When asked for Child link, enter the same album code that you coined for the parent record. Then when asked for Track title, enter the name of the piece. You are then asked for Parent link. Use [ESC] or [ENTER], do NOT give any data to this prompt. The choice of key is made thus: If the performer of this track is the same as you entered in the parent record, then you would use [ESC], which then stops any further prompts. But [ENTER] merely advances to the next prompt, which asks for Performer, which you can now give, followed by [ENTER]. Then Album title is prompted, but ignore this and reply [ESC] to complete this record. Again, you are invited to make adjustments via ALTER Record, and [ENTER] will end this.

Repeat the procedure described in the previous paragraph for each title in the album. Then instead of [A] for another, use [ENTER] to return to main menu. Our MUSIC file has three albums on it, and now you will have added a fourth album. Before displaying MUSIC records, first UN-SELECT your new parent record, using:

SSQ

And now you can display our data and yours too using [D]. There are three report formats in MUSIC, ref 1, 2 and 3. Formats 2 and 3 are designed to view the child records, i.e. list the music track titles.

Display using format 2 for the moment, and note that every record shows performer and album title. But examine some of the records in their RAW state. (In case you forgot how: choose a target record and use [A] then [R]. Then you will see that most of them contain only the track title and child link. Some have the performer also, where different from the parent performer. The relational logic treats parent data AS IF IT IS PRESENT IN EACH OF ITS CHILDREN. In our MUSIC file, each album title is stored just ONCE, as is the main performer.

Format 1 is designed to list just the albums, and to do this first return to main menu and select just the parents, as follows:

SZPX (Or just [I] if all the children were selected)

Now to list the albums via report 1:

C1

Note the versatility of this file; by selecting just parents we can display a summary report of the music albums, while by selecting just the children we can display the full track title list.

NOTE WHAT HAPPENS WHEN ALL RECORDS ARE SELECTED. It is typical of a relational file that one either selects parent or child records, NOT BOTH AT ONCE. This is because your reports will be designed for one or the other, not both. But for example, see what happens when you use report 2 or 3 to display the parents: the track titles are missing. The reason is simple; we did not store a track title field in any of our parent records.

Selecting parents only is simple, from main menu:

SZP

There are several ways to select "children only" starting from main menu, for example try these:

SZPI or SZIQ or VSQ

Use one of these and re-examine report formats 2 and 3. Do you see the essential difference? Format 3 is able to start a fresh screen on change of album title, while format 2 just lists continuously. Format 3 therefore illustrates another very powerful feature of a relational file; the ability to recognise GROUPS of child records.

The GROUP logic works by specifying that one or more DATA items (as opposed to headings) are displayed in the HEADING AREA. Examine format 3 via main menu [F] then [R] [3] etc. and look at the Record data items. Note that two of them, parent link and album title, are coded with zero in the "HA = 0 or RA = 1" parameter. Either of these ensures that DISPLAY will group the records — provided that they are next to each other.

This last proviso is important. If the child records are intermingled, e.g. as they would be if you were to sort the file by track title, then report 3 would fragment into many more shorter pages. But then if you were to select only the children of just one parent (album) and display, then they will all show on one screen. In other words, only a change of parent among the SELECTED records forces the change of page.

We have demonstrated how to build and use a relational file; but what if in our MUSIC file we wish to store a "single" title? The answer is simple, we just create a record which is neither parent nor child. From main menu use [A] then enter data as prompted except just use [ENTER] when prompted for Child link and Parent link. Why not try it and see?

Sorting a Parent/Child file

MASTERFILE inevitably does more work when displaying a child record than otherwise, since for each format data field which it fails to find in the current record, it has to scan the file hunting for the parent. This scan as you might expect starts at the beginning of the file. It therefore makes sense when handling a large file, to keep all the parents at the FRONT of the file. This is done by sorting the file into ascending sequence using a data field not present in the parent. The obvious choice is usually [↑], the child link field, since this also ensures correct grouping in reports like MUSIC format ref 3.

When you added your album to the MUSIC file, the new parent record was stored after all the earlier records. For a file still so small, this has negligible effect. But for larger files there would be a distinct pause when displaying the new records. An alternative to sorting is of course to use DISPLAY mode [I] to insert a new parent directly into its ideal place.

Duplicate Parents

If you have two parents with the same parent link, then their children will all appear to belong to the first parent. Although MASTERFILE allows such a duplication, it is almost certainly an erroneous use. Beware creating this situation through merging two files, each of which contain unique parents links, but which may create duplicate links when combined.

Probably the quickest way to check is to select parents only, and save selected to a work file. Load the work file back, create a new format to list just data ref [>], RA=1 to show 20 per screen, sort into [>] order, and display. Use your eye to detect duplicates.

Orphans

An orphan is a child with no parent. This will probably be a spelling error in one of the link fields. Orphans are recognisable in that their parent data will not display. On large files, they also slow the display since the entire file is scanned for its parent. Orphans are almost certainly incorrect. The "single" MUSIC title discussed earlier is not an orphan, since it is not a child, having no link field at all.

Child-less Parents

A parent without children may also be an error due to mis-spelling, but not necessarily. For example, one may have a relational file where client details are kept in the parent, and individual outstanding invoice details in child records. But if a client has no outstanding invoices at one time, this need not be an error.

USER BASIC PROCESSING

Whilst MASTERFILE can file, search and display your data, it is not capable of any significant processing of it, except for simple totals. For those users who are prepared to write some BASIC, it is possible to manipulate file data in a variety of ways. This is by virtue of MASTERFILE's Basic loader program which defines several entry points which may be CALL'ed. USER BASIC making use of these calls is written into the loader program which can then be re-saved under any suitable name for regular use.

USER BASIC can be used to examine/alter/replace/insert data within selected records. It can erase records, insert new records — even create a whole new file from another data source. It can be used to create summary reports, and to perform complex computations. Approximately 7K is available for USER BASIC, excluding buffer space.

The full list of entry points which may be called is as follows:

- START (&8000)** Behaves just like initial load, forgetting any file in RAM
- RESUM (&8003)** Resumes main menu with file intact

Particularly relevant to USER BASIC are:

GETR (&8006)	Accesses the nth selected record, which becomes "current"
GETD (&8009)	Retrieves specific data from the current record
PUTD (&800C)	Stores/replaces data in the current record
ERAD (&800F)	Erases specific data from the current record
ERAR (&8012)	Erases the current record
INSR (&8015)	Inserts a new empty record which becomes current
UNSL (&8018)	Un-selects the current record

We suggest that you use these names for clarity, but note for example that "CALL GETR" is equivalent to "CALL&8006".

When MASTERFILE is loaded, the loader's line 40 sets the default colours and calls START which produces the main menu. Pressing [B] or [U] at the main menu therefore completes the CALL and resumes Basic at line 50. The loader simply displays "Basic Environment" and then either stops with a LIST or else does GOSUB 200, depending on whether [B] or [U] was pressed. If you then enter GOTO 100 this resumes the main menu with the file intact, since RESUM is used. If on the other hand you GOTO 40 — or even RUN — the main menu is produced but any file that was present is forgotten.

USER BASIC must start at line 200, and complete with RETURN in order to resume the main menu.

Before we examine GETR etc. in detail, it is necessary to learn something about MASTERFILE file structure. A file consists of data names, report formats and data records. Only data records are accessible to USER BASIC, and of these, only SELECTED records can be processed. Each record has a one-byte header whose value for selected records is &CO. Following the header are DATA ITEMS, in any order, and each comprises:

- 1st byte: Data Reference, in the range !(&21) to ↑(&5E)**
- 2nd byte: Binary length 1–240 of the following data**
- 3rd etc. bytes: Data, 1–240 ASCII characters**

Data items are passed to and from USER BASIC in undimensioned strings, and for such an item in D\$:

- Data reference is LEFT\$(D\$,1)**
- Data length is ASC(MID\$(D\$,2,1))**
- Data text is MID\$(D\$,3,ASC(MID\$(D\$,2,1)))**

Note that the data length is not necessarily a printable character.

Retrieved data text can also be expressed more simply as MID\$(D\$,3) provided that D\$ has been filled with spaces before using GETD. Thus a numeric value can be extracted for arithmetic purposes using the expression VAL(MID\$(D\$,3)).

A formal definition of each CALL follows. Many of the calls make use of variable "inds" as a status indicator which the CALL'ed routine sets to indicate error conditions for example.

GETR: Access a Record

CALL GETR,n,@inds

— where n is the number of the record to be accessed, and inds is set by GETR to one of the following:

"E"	if the record is not found, "end-of-file"
"P"	if the record is a PARENT
"C"	if the record is a CHILD
" "	if the record is not relational

The number n may be a literal number or the name of a numeric variable containing the record number. Record number x simply means "the xth selected record". For most purposes one would simply process records sequentially by starting n at 1 and adding 1 each time through. If n is greater than the "Selected =xxxxx" value, then inds is set to "E". The accessed record is deemed to be the CURRENT record for the purposes of most of the other functions.

GETD: Get Data from Current Record

CALL GETD, @d\$,@inds

— where d\$ is any string variable which is to receive the data item. The string variable must be long enough to receive the data if truncation is to be avoided, and the first character of d\$ denotes the target data reference. It is best to fill the rest of d\$ with spaces before using GETD. The complete data item, including the data reference and data length, is placed into d\$. If the target data is absent then the data length is set to binary zero. The variable inds is returned as one of:

"N"	if the data is not found
"P"	if found but via the parent of the current record
" "	if found in the current record

We now have enough material for an example, which simply displays all names (data ref "N") from selected records:

200 n=1	init record count.
210 WHILE 1	do always ...
220 CALL GETR,n,@inds:n=n+1	access nth rec,
	advance n
230 IF inds="E" THEN RETURN	if no more, end.
240 d\$="N"+SPACES(30):CALL GETD,@d\$,@inds	retrieve "N" data
	into d\$
250 PRINT MID\$(d\$,3)	display data
260 WEND	repeat ...

PUTD: Insert/Replace Data in the Current Record**CALL PUTD,@ds**

— where **ds** is a string variable containing the data item. If an item with the same data reference is already present, then it is replaced with the supplied item. Otherwise, the new item is inserted. The supplied string must start with a valid data reference. The data length byte need not be valid, since PUTD ignores it and replaces it with $\text{LEN}(\text{ds})-2$. In other words, the length of **ds** determines the data length byte. Any leading and trailing spaces in the data are dropped, and any invalid text is edited to "*" — a safety precaution to maintain the integrity of the file.

ERAD: Erase Data from the Current Record**CALL ERAD,@ds**

— where **ds** first character contains the data reference of the item to be erased from the current record. For example, to erase item "K":

ds="K":CALL ERAD,@ds**ERAR: Erase the Current Record****CALL ERAR (no parameters)**

Notice that after erasing the *n*th record, the next selected record in the sequence is still the *n*th, since GETR counts from the beginning of the file every time. After an ERAR call, there is no current record until another GETR or INSR is issued.

INSR: Insert a new Empty Record**CALL INSR (no parameters)**

The new record is inserted after the current record, or onto the end of the file if there is no current record. The new record becomes the current record. INSR is of particular use in generating a new file from external data, and would be followed by PUTD to move the data into the new records.

UNSL: Un-select the Current Record**CALL UNSL (no parameters)**

The current record is made un-selected, and also no longer current. This allows USER BASIC to perform special searches beyond the scope of MASTER-FILE's own search logic. Note that just as with ERAD, the next record is the same number of the record just un-selected.

If USER BASIC is used to alter a file, then presumably the file will require to be saved; this is achieved simply by returning control to MASTERFILE main menu and then invoking the file save function.

EXAMPLES OF USER BASIC**Example 1:**

In this example, selected records from a stock file are processed so as to re-calculate and store the stock value in each record. It multiplies stock level by unit cost, and stores the result into stock value. Stock level is data ref "L", unit cost is data ref "C" and the stock value is data ref "V".

```

200 N=1:WHILE 1
210 CALL GETR,N,@inds:N=N+1:IF ind$="E" THEN RETURN
220 d$="L"+SPACE$(20):CALL GETD,@d$,@inds:SLEV=VAL
    (MID$(d$,3))
230 d$="C"+SPACE$(20):CALL GETD,@d$,@inds:UCOST=VAL
    (MID$(d$,3))
240 d$="V."+STR$(SLEV*UCOST):CALL PUTD,@d$
250 WEND

```

Explanation:

- Line 200 initialises the record number and starts the loop.
- Line 210 access the Nth selected record, adds 1 to N, and returns to the main menu when there are no more records to process.
- Line 220 retrieves Stock Level from "L" data, converts to numeric into SLEV.
- Line 230 retrieves Unit Cost from "C" data, converts to numeric into UCOST.
- Line 240 builds a new Stock Value field "V", the string of the computation of SLEV*UCOST, and stores it in the record.
- Line 250 repeats from 210.

The use of VAL and STR\$ functions is typical where arithmetic manipulation is required, since all MASTERFILE data is filed in ASCII (string) format.

To execute the program, the stock records must be selected, then main menu option [U] is used. On completion, the main menu is resumed and the updated file can be displayed and saved.

Example 2:

Suppose we wish to erase a particular field, data reference "X", from all selected records. See how easy this is:

```

200 N=1:WHILE 1
210 CALL GETR,N,@inds:N=N+1:IF ind$="E" THEN RETURN
220 d$="X":CALL PUTD,@d$
230 WEND

```

Example 3:

To see this example, just LOAD "CHREF" and LIST it. We have put it on your disc because it might be useful to you as it is. CHREF is a version of MASTERFILE loader which has USER BASIC to change a data reference throughout the selected data records. To use it, RUN "CHREF", use it to load your file, and select the records (presumably all) to be affected. Then [U] at main menu. The program gives a progress report as it goes, and also checks that the new data reference is not already in use. However, do note that it does not alter the data names or the formats — this you must do using the standard MASTERFILE facilities.

Error Handling

Generally, errors are handled by ignoring a bad request. For example, if you try to GETD/PUTD/ERAD/ERAR/UNSL when there is no current record, then the system just BEEPS and ignores. For this reason, it is best not to run with the sound completely off.

A serious error such as inserting data when the file is full, behaves the same as MASTERFILE proper, with a warning message, a BEEP, and the insertion is suppressed. To break out of an overflow loop, press [ESC] [ENTER] [ESC].

FIELD-TO-FIELD CALCULATION via UBGEN

USER BASIC can create new data in each record, derived from other fields already present. But not all users feel confident with BASIC, and may feel alarmed at the prospect of coding such things as MID\$, STR\$, VAL etc. And so we have provided a program called UBGEN, which will do all the hard work for you. All you have to do is to tell it the formulae, such as "A=B+C". The system is not suitable for complex applications requiring "IF/THEN/ELSE", or for calculations between records. But for direct field-to-field numeric calculations within each record, UBGEN does an admirable "programmer" job.

UBGEN constructs a tailored MASTERFILE loader, which you then use instead of the standard loader, to handle the file(s) on which you wish the formulae to operate.

Use UBGEN as follows: System-reset the computer, if not just switched on, then:

- a) **RUN "UBGEN" [ENTER]**
- b) The program first waits for you to insert a non-protected disc containing DISC.BAS, the standard MASTERFILE loader. [ENTER] when ready.
- c) The program asks for a formula. Enter your formula in the form of:
 data ref = expression
- d) You are invited to give more formulae. [Y] for more, otherwise [N].
- e) The program creates a new loader program consisting of DISC.BAS merged with the generated USER BASIC code; this new loader program replaces UBGEN in the computer. The new loader program you may then SAVE under any suitable name, e.g. DISC, or you can RUN it immediately to test it.

Run MASTERFILE via the new loader program, load the file, select the records which are to be processed, and from main menu press [U] to perform the calculations. You can do this at any time, on demand. If the computed fields are already present, they are simply re-computed and replaced. The message "Processing record nnnn" informs you of progress.

If the formula works correctly, then save the generated loader for future use with the associated file.

Notice that only data references to the range A–Z are allowed within a formula. You may use upper-case or lower-case with equal effect. Any non-numeric or absent data will be treated as zero. For simple addition and subtraction, use [+] and [–]. For multiply, use the star [*] symbol; and for divide use oblique [/]. Use round brackets to control the sequence and to contain any function parameters. Spaces between terms are optional; in fact the rules of grammar (syntax) are those of Amstrad BASIC. With multiply and divide, which can generate unwanted extra decimal places, it is advisable to make use of the ROUND function. For example to calculate net and VAT amount from just the gross amount, use two formulae:

$$N = \text{ROUND}(G/1.15,2)$$

$$V = G - N$$

This means: "Calculate data N from data G divided by 1.15, the result rounded to two places, and store data N in the record. Then calculate data V as data G minus data N, and store data V in the record."

It is sometimes convenient to specify a calculation using intermediate values which are not to be stored in the records. This can be done simply by inventing data names which are two or more letters long, as in the following example:

$$\text{WORK} = (A + B + C + D)$$

$$V = \text{WORK} / 4$$

In this simple example, "WORK" is not a data reference, so the first formula does not store its value back into the record. But the next formula uses "WORK" to create "V" which does then get stored in the record.

UBGEN saves a temporary program UBASIC.BAS, which you can erase from the disc. If you wish to see the generated code, LOAD "UBASIC":LIST [ENTER].

KEY-BY-KEY EXAMPLE

Here is a simple exercise to create a file of names and telephone numbers. We show exactly what keys to press. As usual, single keys shown in square brackets need not be in upper case, we just show them in this way for clarity.

BEFORE you press each of the keys shown in square brackets, study the screen to find out WHY you are about to choose that particular key. If you key the exercise blindly, you will learn nothing. We show what to key on the left, and our commentary is on the right.

As with all new files, start with an empty file, showing "RAM used:00K" in the file statistics. If this is not showing, then from main menu press:

[P]	Purge
[C]	Total file
[Y]	Confirm

The first thing to do with the new file is to establish the data names and data references, and starting at main menu:

[N]	Choose "Data Names" processing
[I]	Insert new data name
[ENTER]	Not at any particular place
[N]	Choose this data reference
Name [ENTER]	Store the data name "Name"
[I]	Insert another new data name
[ENTER]	Default is after the last existing name
[T]	Choose this data reference
Telephone no [ENTER]	Store the data name "Telephone no"
[X]	Exit to main menu. Data names are complete.

Already the "RAM used:01K" registers a file has started, but "Records:0000" shows that no data records have been created yet. We can now start to add records to the file:

[A]	Add a record
-----	--------------

At once, the data names are used as prompts, the first being "Name:"

Peter [ENTER]	name
555 6666 [ENTER]	telephone number
[ENTER]	no immediate changes to make
[A]	yes, add another record immediately
William [ENTER]	name
0523 57781 [ENTER]	telephone number
[ENTER]	no immediate changes to make

[A]	yes, add another record
Airport [ENTER]	name
01-245 6789 [ENTER]	telephone number
[ENTER]	no immediate changes to make
[ENTER]	No more records for now, return to main menu.

Now you should see "Records:0003 Selected:0003" in the file statistics panel, reflecting what you have just done. Now you must define a format in order to be able to display the file. Try [D] now just to see what happens when there are no formats. Now [ENTER]. But now to create a format:

[F]	to FORMAT a report style
[N]	insert a NEW format
[1]	call it reference "1"

At once the GEOMETRY questionnaire is presented. We will leave most of the defaults for now and just alter the title:

[A]	ALTER the geometry
[ENTER seven times]	to position the diamond at the title line
Telephone List [ENTER]	The new title. The diamond vanishes.

Now to create a Record Data item:

[I]	Insert a format item
[D]	of the Record Data variety

At once a Record Data questionnaire is offered, awaiting alteration i.e. the diamond mark is already in view and the lower part of the screen prompts for a data reference.

[N]	Data reference of "Name"
[ESC]	No more changes to this item, the diamond vanishes.

[D]	to test things so far. Peter, William and Airport should appear.
-----	--

[D]	Return to format work. Now for telephone number:
-----	--

[I]	Insert a format item
[D]	of the Record Data variety

[T]	Data reference of "Telephone no"
[ENTER]	Skip this parameter
4 [ENTER]	Specify column 4
[ESC]	No more changes to this item, the diamond vanishes.

[D]	To test the display.
-----	----------------------

We made a (deliberate) error just now, specifying column 4 for telephone number which partially overlaps our names which start at column 1. Now correct this to column 30 instead:

[D]	Return to the format work
[A]	ALTER the faulty item. The diamond appears.
[ENTER twice]	to skip down to the column entry.
30 [ENTER]	Specify column 30
[ESC]	No more changes
[D]	To test the display.

The names and numbers should now appear correctly. This is a very simple report made up of just two data items, no headings, and no ruled lines. Let us now add some lines between the double-spaced entries:

[D]	Return to format work
[I]	Insert a format item
[L]	Of the Ruled Line variety
[ENTER six times]	Default first 6 parameters
11 [ENTER]	We want to draw 11 lines
2 [ENTER]	At 2-line intervals
[D]	To test the display
[X]	To the main menu

Now we shall sort the file into ascending order by name:

[O]	Order (Note: letter O, not zero.)
[N]	By "Name"
[A]	Ascending
[C]	Character rather than numeric

A sort of this size is instantaneous, so it BEEPS completion and returns to the main menu almost before you can take your finger off the [C] key!

[D]	Display the result, showing Airport, Peter, William.
-----	--

Now suppose Peter's telephone number is to be changed. First, use [DOWN] to highlight the TARGET record, which is Peter. If you overshoot, use [UP]. Then:

[A]	ALTER Record mode
[A]	ALTER field
[T]	Data ref. of Telephone no

At this point, the TEXT EDITOR offers a cursor over the "555 6666" in the edit window. We wish to insert the dialling code of "01-", so:

[UP]	In TEXT EDITOR mode, this means "Insert Mode", and this is acknowledged with the triangle in the panel.
01-	Inserts this, shifting the "555 6666" to the right.
[ENTER]	Completes the change to the field.
[ENTER]	Completes the change to the record.

Try other alterations, and get to know the TEXT EDITOR. And try this:

[D]	Nothing happens, why not?
-----	---------------------------

Answer: [D] only works if DISPLAY was entered from FORMAT mode. Here we came in via main menu, so now the only way to get back to our format is as follows:

[X]	To main menu
[F]	Format
[R]	Review
[1]	Format reference 1

Now you see the geometry again. Press [N] to view each format item in turn. If you have a printer then switch it on and use [P] to list your format items on paper.

[X]	To first format menu
[X]	To main menu.

FOLLOW-UP EXERCISES

You should now know your way around, especially between MAIN MENU, DATA NAMES, FORMAT, and DISPLAY functions. We suggest the following further exercises, based on this telephone list file.

- Erase or purge the three fictional records.
- Add thirty or more real names and numbers from your own telephone book.
- Alter the HA depth in the geometry from its default of 1, to 3.
- Insert headings "Name" and "Tel" in line 2 of the HA.
- Remove the ruled lines item and alter the geometry RA depth to 1 for a more compact single-line spacing.
- Alter name position from column 1 to column 3, and reduce its display width from the default 40, to 25.
- Insert a pair of horizontal lines to enclose the headings.
- Insert a pair of vertical lines to frame the report. Use "Mid-char ends = Y" to get clean corners.
- Sort the file into name sequence.
- Search the file for a particular name, for example:

[S] [Z] [S] [N] [S] Peter [ENTER] [D]

- k) Save the file, e.g. using the file name TELNOS.
- l) Experiment with the example files provided, FILE1 and FILE2.
- m) If you want something more challenging, study the RELATIONAL FILES chapter and experiment with example file FILE3 and MUSIC.

BUILDING A NEW FILE

Here is a step-by-step guide on how to design and build a file.

1. First, leave the computer switched off and find pencil and paper.
2. Write down a list of all the different fields you would like the records to hold. For example, if you are a retailer you might want a stock list.
 - Stock number
 - Stock description
 - Supplier reference
 - Wholesale price
 - Buying quantity
 - Mark-up
 - Selling price
 - Selling quantity
3. For each field, estimate the average number of characters to be held, and then add TWO. Estimate the record size of summing these field sizes and then adding ONE. Divide 64000 by this. The answer is the likely maximum number of records that will fit in one file. (Why not use 65536? Because data names and report formats will take a few hundred bytes.)
4. If you need more records than will fit, either find a way to abbreviate data or eliminate non-essential fields. For your stock list, do you need both Mark-up AND Selling price? On the other hand consider splitting the file into two or more, e.g. one file for liquid goods, another for solids, or foodstuffs separate from other goods.
5. Having SIZED your problem, and having allowed for expected growth in file size, think now about how you expect to use the file. Can you store data in a way so that all the searches you need are possible? Can you envisage what the preferred sequence of the file will be, e.g. stock reference order, or supplier reference order? Will you need periodic full print-outs? File sequence is more important for hard copy than for screen work.
6. If you envisage very much repeated information, and you think you can manage a relational file, and does this look feasible? We do not advise inexperienced users to start with a relational file.
7. Sketch one or two screen layouts. Use tracing (see-through) paper on our screen spacing chart.
8. NOW you can switch on your computer. If you need to start a fresh disc for your file, format it for DATA and copy the essential MASTERFILE components to it. (DISC.BAS and MF128MCD.BIN).

9. Run MASTERFILE.
10. Use main menu [N] to store your data names — short, but meaningful to you.
11. [A] and add three realistic records — no more.
12. [F] and build your first format, call it reference 1. After EACH item has been created or altered, use [D] to test it — which is why you need some data first — and then [D] back to alter it or carry on with the next item. Remember to leave room for any ruled lines you may wish to add.
13. Create any other formats you may need.
14. Insert/Add the rest of the records. Sort into desired sequence.
15. Save the file.
16. Go and make yourself a well-earned drink.

PROGRAM CUSTOMISATION

It is possible to customise MASTERFILE by inserting lines of BASIC between lines 150 and 200. Line 150 is given control once on start-up, just before the main menu is presented. One can use main menu [B] to enter the BASIC Editor mode, insert the custom lines, and re-save the loader. When the program is loaded next time, the custom code will be executed. To resume the main menu from BASIC Edit mode.

GOTO 100 [ENTER]

To test a custom line immediately without re-loading the program, or to use on a one-off basis, key it without a BASIC line number.

Loader Basic

This we have called "DISC.BAS" but you can adapt and save under any suitable name. As before, about 11K is available to the user although the size of the Basic program itself is limited to around 7K since the CPC Basic allocates 4K buffers during LOAD. Lines between 150 and 190 are reserved for custom POKEs and other special effects such as setting printer controls and KEY expansions. Lines 200 onwards are reserved for User Basic, which can return to main menu via RETURN. We have supplied a do-nothing skeleton which just Beeps (line 9990).

Colours

Main menu [*] offers a colour tuning service. Take note of the colour numbers it displays, and if you wish to make your own choice of colour automatic in future then alter line 30 accordingly, and re-save the loader.

[See line 30: The paper colour nn is set via INK 0,nn; the text colour nn is set via INK 1,nn; the border colour nn is set via BORDER nn.]

KEY Expansions

The most obvious use of custom code will be to program the fuction keys to simulate multiple key depressions. For example:

151 KEY 1,"LMUSIC"+CHR\$(13)	Load file MUSIC
152 KEY 2,"SZS*S"	'Start global string scan
153 KEY 0,"GOTO 100"+CHR\$(13)	'Resume main menu

It may also be useful to have the custom code PRINT a reminder on the screen to list which keys are programmed, and for what. e.g.

```
161 PRINT "[f1] to load MUSIC file"
162 PRINT "[f2] for global string search"
163 PRINT "[f0] for GOTO 100"
170 INPUT "[ENTER] to continue";a$
```

Even if you do not aspire to programming any BASIC, it is worth studying the use of KEY, and also KEY DEF; they are very useful indeed. Note our example line 151, where [ENTER] is programmed using the CHR\$ function.

MASTERFILE automatically provides an enlarged KEY expansion buffer, of 250 characters, rather than the hundred or so of the CPC when first switched on. Note that any KEY expansions set before MASTERFILE is loaded, are lost. But KEY statements coded after line 150 are accepted. If you particularly want to leave the Key Expansion buffer as set by an earlier program, then simply remove the ":CALL &8027" from line 30 of MASTERFILE's loader program.

Note that any expansion string containing "P" to print or "O" to sort will appear to lose any further letters, since both DISPLAY [P] and SORT [O] "suck" the keyboard for possible [ESC] values to abort.

POKE Customisations

By altering the MASTERFILE machine code it is possible to tailor the program in several respects. To alter the machine code, the POKE statement is used, anywhere between lines 150 and 200. The syntax of a POKE is:

POKE <address expression>,<integer byte value>

The customisation POKE addresses are as follows:

- &802A LF printer code, normally 10. POKE to 0 to suppress LF if you have a double line-feed problem. MASTERFILE sends CR and LF after each line, but some printers create their own LF when they see CR.
- &802B When exporting field [↑], you can change the field identifier to a more suitable letter, since TASWORD does not allow [↑]. For example, to send lower case "a" instead, POKE &802B,ASC("a").
- &802C Similarly, this address can be used to send a substitute identifier instead of [>].
- &802D POKE to 0 if required to disable use of [ESC] during sorting, for example to permit embedded [0] in a key expansion to be effective.
- &802E The pound-sign prints by sending ASCII code 35. Some printers stubbornly produce a number-sign instead, and need a different code for pound-sign. If your printer requires a different code then POKE this code at &802E. However, if the code you wish to send is greater than 127 then you must instead send a sequence of codes to: turn on MSB, send code minus 128, turn off MSB. Up to five codes can be sent by POKE-ing them in &802E to &8032. Typical codes may be:

27 ESC

62 ">" to turn on MSB

1 129-128 (for printers which use 129 for pound-sign)

27 ESC

61 "=" to turn off MSB

&8034 DISPLAY [P] sends ESC "C" nn to the printer to set the form's depth. If your printer is not EPSON-compatible in respect of this control sequence, then POKE &8034,0. In this case, you may wish to set the printer form size manually.

&8035 For the purpose of matching parent/child links, by default the data is case-specific, i.e. [↑] ABC will not match [>] Abc. Also, for the purpose of character sort, "Z" is lower than "a". To achieve full case-independence in these situations, you can **POKE &8035,&DF**.

&8036 For [CTRL 0] hi-resolution screen copy, the printer is set to form feed depth of 7/72". For some printers, the print head is shorter and a lower value is needed to avoid thin white lines across the image. Hence, to reduce the feed rate to 6/72", you must:

POKE &8036,6

&8037 Continental users may wish to use alternative characters for sort key marker. The default key marker is "\", but an alternative character may be stored via custom poke as follows:

POKE &8037,ASC("x") where x is the chosen sort key marker

&8038 Similarly, the line-break character of underscore [SHIFT 0] can be replaced with an alternative as follows:

POKE &8038,ASC("y") where y is the chosen line-break character

Note that file processing customisation is the subject of a separate chapter, USER BASIC.

SAVING MASTERFILE

The main program has just two essential components:

MF128MCD.BIN which is the main machine-coded logic
DISC.BAS which is loader and skeleton User Basic

The other material on the MASTERFILE III disc is not essential for normal use, and consists mainly of example files.

MF128MCD.BIN may be duplicated using the standard CP/M utilities, such as FILECOPY, DISCKIT3, PIP.

DISC.BAS may also be duplicated this way, or more simply one can LOAD it and then SAVE it just as one would any other Basic program. This will be normal procedure if you are developing various User Basic programs. The save name can be anything which Basic allows. Therefore you may have several loaders on the same side of a disc.

We present a miscellany of tips and cures.

PROBLEM: "Disc Full" when saving a file.

Press [ENTER] then [C] to view the disc catalogue. See if there are files which can be erased to make room. Use [E] or [B] options if so. Compare the "xxK Free" with the file size in the file statistics panel to predict if there is room to save. If no room, use another disc.

PROBLEM: I can load a file but get "not found" when I try to erase it. Erase is fussy, it needs the full name. Try again with ".BIN" suffix.

PROBLEM: I have loaded a file but now it shows a different file name. Probably due to a disc file rename. This is harmless, but be sure to enter the right name when saving the file again.

PROBLEM: Unexpected "Press PLAY then any key"
You have accidentally selected TAPE operation. [ESC] [ENTER] [D] [ENTER] and try again.

PROBLEM: The program refuses to obey any menu keys, with no explanation. If you have by mistake requested a print-out via [P] or [CTRL O] and the printer is either not ready or non-existent, only [ESC] can rescue you. Try it.

PROBLEM: The printed output is double-spaced, only three lines to the inch instead of six.

You probably need to suppress LF — see POKE Customisation.

PROBLEM: Printed output does not keep in step with forms or labels. You have made a mistake in Geometry forms' depth, HA depth, or RA depth, or you have a double LF problem.

PROBLEM: Child records of the same parent are not all grouped together. Grouping is only possible if the file is sorted by child link, or if only one family is selected at a time.

PROBLEM: After [D] for DISPLAY, only the title appears, the rest of the display area is empty, not even any headings.
This is probably because "Selected:0000". Select some records and try again.

PROBLEM: How do I give a new file a file name?
Save it!

PROBLEM: KEY expansions coded after line 150 have no effect. No, they won't until the program is re-loaded. But you repeat the KEY command without a line number for immediate effect.

PROBLEM: Pound-sign prints as a number-sign.
Find out what code your printer needs for pound-sign, and consult CUSTOMISATION chapter.

PROBLEM: I want to use [\] key to extend the alphabet.
Consult the CUSTOMISATION chapter, it is possible to use another key for sort key prefix. You can either put SYMBOL list into the loader, or use a separate program to set your special characters before loading MASTERFILE.

PROBLEM: I want to insert a new data name at the top of the list.

Insert it after the first name, then erase the first name and re-insert it after the new name.

PROBLEM: Search refuses to find "J Smith" when I know he is there.

Maybe he is "J\Smith" or "J Smith" in the RAW state. Search does not take account of these. Use String Scan just for "Smith" instead.

PROBLEM: Some records take a long time to display.

You have a large file, and parents are either missing or not at the beginning of the file.

PROBLEM: I have erased a data name: has this lost the record data?

Not at all. Data names are there purely to form a menu, and only EXPORT demands that a data reference is defined.

PROBLEM: How can I change a data reference without erasing and re-keying all the affected fields?

Use the CHREF utility provided. CHREF is a loader with USER BASIC which lets you make a global data reference change.

PROBLEM: The screen is totally blank and will not respond.

Perhaps while you left your desk, the office joker used [*] etc. to set all the colours to the same value. You can use this trick yourself if you need to leave your station unattended for a short while, and wish to keep the screen private.

MEMORY ORGANISATION

The Basic environment of MASTERFILE has a MEMORY ceiling of &2FFF, which therefore allows 12K for the loader and USER BASIC.

The 4K space between &3000 and &3FFF is used for file buffers and other work space.

The 16K space between &4000 and &7FFF is a "window" through which the extra RAM (containing the file) is viewed, one quadrant at a time. Most of this address space is also occupied by the main program logic, which extends to about &9900.

The CPC6128 extra 64K RAM is used for the file.

FILE STRUCTURE

It is not necessary to know how data names and formats are stored in the file, but it is useful to see how data is organised in the main part of the file which contains your data records. For a simple file like FILE1, if we could inspect a few of the records they would look like this:

1. N Campbell Systems
 A 57 Trap's Hill _Loughton _Essex IG10 1TD _England
 T 01 508 5058
2. N James\Kelly
 A 11 Sussex Gardens _Croydon _Surrey CR22 5EQ
3. N Mr W\Larksfoot
 A 6 Cheltenham Gardens _Bristol _BS11 8YQ
 T 0272 38993

The first letter is the data reference. Following the data reference we show a space, but in the file this is a binary length byte, not printable as a character. Note that not all fields are present in all records, e.g. record no. 2 has no "T" data.

For a relational file like MUSIC, we can see that the parent records are rather different from the child records. Just a few records are shown:

Parent records:

1. > AT
 P Art Tatum
 A Here's Art Tatum
2. > SM
 P Julie Andrews
 A The Sound of Music
3. > AP
 P Andre Previn
 A Sound Stage

Child records:

4. ↑ SM
 T Climb Ev'ry Mountain
 P Chorus & Orchestra
5. ↑ SM
 T Do-Re-Mi
6. ↑ SM
 T Edelweiss
 P Christopher Plummer
7. ↑ AP
 T Around The World

For DISPLAY purposes, each child record shares data from its matching parent, so that records 4 to 7 above seem to contain:

4. ↑ SM
 T Climb Ev'ry Mountain
 P Chorus & Orchestra
 A The Sound of Music
5. ↑ SM
 T Do-Re-Mi
 P Julie Andrews
 A The Sound of Music
6. ↑ SM
 T Edelweiss
 P Christopher Plummer
 A The Sound of Music
7. ↑ AP
 T Around The World
 P Andre Previn
 A Sound Stage

Record Size

Within a record, the order of the fields is neither constant nor important. The number of bytes (characters) in each data record is:

$$1 + 2N + K$$

where K is the total number of data characters keyed in the record and N is how many fields are in the record.

The odd "1" in the equation accounts for the record header byte which not only identifies a fresh record, but also encodes the select/un-select status. Each field commences with its data reference letter, followed by a binary byte which is the length of the data, followed by the data.

GLOSSARY OF TERMS

Many of these terms are standard in the computer industry, but some are defined purely in the way they are used in MASTERFILE, e.g. CHILD. If in doubt about the meaning of any text in this manual, do make use of this glossary.

AMSDOS	The name given to the CPC operating firmware.
ALTER RECORD	Where a record contents can be altered.
ARGUMENT	Something with which records are compared during search.
ASCII	International standard code enabling letters and other special symbols to be represented by a numeric value.
BACK OUT	Change your mind.
BACK-UP	(Make) a security copy of program or file.
BASIC	Beginners All-purpose Symbolic Instruction Code.
BASIC LOADER	Small BASIC program to load, initialise, and give control to the MASTERFILE machine code.
BEEP	A sound to warn of possible error, or end of sorting.
BYTE	A unit of computer memory, holds one ASCII character.
CATALOGUE	List of active files in a disc.
CHILD	A record with a [↑] field.
CP/M	A machine-independent control program, not used by MASTERFILE.
CPU	Central Processing Unit, the processing engine of a computer.
CR	Abbreviation for Carriage Return, usually an instruction to move a print head to the far left.
CURSOR	A solid mark on the screen where keyed text will be echoed.
CURRENT RECORD	The object record as referred to in USER BASIC.
DATA	Information.
DATA NAME	Brief description of a data field.
DATE REFERENCE	Key letter by which a data field is chosen.
DEFAULT	An assumed value or decision if you do not specify otherwise.
DISPLAY	Mode where SELECTED records are presented using a FORMAT.
EDITOR	See "TEXT EDITOR".
EDIT STATUS	Panel showing Insert/Caps indicators during TEXT EDITOR use.
EOF	End-Of-File. Also, a special ASCII code (26) indicating this.

ESC	Often, the key used to BACK OUT.
EXECUTE	Give control to.
EXIT	Usually a return to the previous menu or to the MAIN MENU.
EXPORT	Create a file of data which other programs can read.
FIELD	The unit of data in a record, containing 1-240 characters.
FILE	All records and associated data names and formats. Also, this or anything else saved on disc.
FILE NAME	The name of a file.
FILE STATISTICS	File name, record counts, space used, usually shown in the lowest screen line.
FILLER	Character displayed if data is not present.
FIRMWARE	ROM-resident control programs, such as AMSDOS, BASIC.
FORMAT	Style of DISPLAY. The set of questionnaires specifying this.
FORMAT REFERENCE	A key letter by which a FORMAT is chosen.
FORMS DEPTH	The total number of lines from one form's perforation to the next. Usually, inches times 6.
FUNCTION KEY	A key, usually [f0-f9] which can be programmed to mimic a series of key presses.
GEOMETRY	The format item which controls the overall aspects of a report.
HA	See "HEADING AREA".
HEADING	Fixed text from a FORMAT, displayed to describe record data.
HEADING AREA	Optional display area, reserved nominally for headings.
IDENTIFIER	Two-character prefix, e.g. "&N" to exported data.
ITEM	A component of a FORMAT specification.
INVERT	Make selected records un-selected, and vice versa.
LF	Abbreviation for Line Feed, usually an instruction to a printer to advance the paper by one line.
LINE-BREAK	An underscore character within the data which forces a change of line when displayed.
LOAD	Read into RAM from disc.
MACHINE CODE	Code which instructs the (Z80) CPU chip directly.
MAIN MENU	The menu offered when MASTERFILE is first loaded.

MARGIN	For printing, displacement of all output to the right.
MENU	A list of options on the screen.
MERGE	Combine some or all of another file with the one already in RAM.
ORDER	Same as SORT.
PARAMETER	Controlling value.
PARENT	A record with [>] field.
PIXEL	A dot on the screen.
POKE	Store into a byte of RAM.
PROMPT	Message inviting a response.
PURGE	Erase from RAM (not from disc).
QUESTIONNAIRE	A list of parameters making up a format item.
RA	See "RECORD AREA".
RAM	The alterable part of a computer's memory.
RAW DATA	Data as keyed and stored, not always as it is displayed.
RECORD	A set of associated fields.
RECORD AREA	Screen space in which to display data from one record.
RECORD NUMBER	Position of a record among all or selected records.
RELATIONAL	Describing a file where data sharing takes place by virtue of matching PARENT and CHILD records.
REPORT	The display style generated by a FORMAT.
RIGHT-JUSTIFY	Show a field against the right edge of its display area.
ROM	The non-alterable part of a computer's memory.
RULED LINES	Embellishments to a display.
SAVE	Store on disc.
SCAN	See "STRING SCAN".
SEARCH MODE	Where records are systematically selected or unselected.
SELECTED	Of records which are eligible for display/alter/export etc.
SORT	Physically re-arrange records into ascending or descending order of a particular field.
STRING SCAN	Look for a piece of text anywhere within a field.
SYNTAX	Rules of grammar, so that the computer can understand you.

TARGET RECORD	In DISPLAY; the record affected by ALTER etc.
TEXT EDITOR	Where you can key or alter text, under cursor control.
TITLE	Report/format description and Top-most display heading.
UN-SELECTED	Opposite of SELECTED.
USER BASIC	User's special processing written in BASIC.
WINDOW	Message/reply area on the screen.

Notes

MASTERFILE III FEATURES

MASTERFILE III is the successor to the very popular MASTERFILE 464 and MASTERFILE II programs. It is a disc filing system of immense speed and versatility to suit all users of Amstrad CPC 128K machines. Only one disc drive is required. A comprehensive illustrated manual is included.

Most filing systems can store, search, update, display, and print.
But MASTERFILE III offers very much more ...

- Fully machine-coded for speed
- Fully MENU-driven
- Variable-length fields and records
- Field-to-field calculations
- Multiple User-defined screen formats
- Clever data presentation options
- Data sharing RELATIONAL capabilities
- Multiple column totals, + or -
- Communicate data to other programs, e.g. PROTEXT/
PROMERGE/TASWORD
- Sort ascending/descending
- Ultra fast file search, any number of criteria
- Fast Screen/disc handling
- File Save/Load/Merge/Split/Erase
- USER BASIC for customised data processing
- Printed output up to 160 columns
- Compatible with earlier CPC MASTERFILE files

File capacity is 64K, about 1,000 names and addresses for example.
Over 50 fields per record, up to 240 characters per field.

Applications include:

Address lists, Label printing, Stock control, Music/book indexing,
Insurance inventory, Shares portfolio, Bibliography, Philately, Club membership/
subscription list, Price lists. Just about any card-index application can be
brought into the computer age with MASTERFILE III

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